

NAVAL SUBMARINE MEDICAL RESEARCH LABORATORY
Naval Submarine Base, Box 600, Groton, Connecticut 06340

ANNUAL REPORT OF PROGRESS SUMMARIES

Research and Technology Resume


-- DD Form 1498 --

as of 10 January 1973

Prepared by

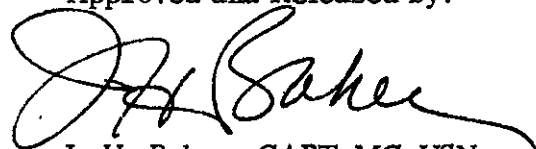
Jessie W. Kohl, B.A.
Technical Publications Editor

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Charles F. Gell, M.D., D.Sc.(Med)
SCIENTIFIC DIRECTOR
NavSubMedRschLab

Approved and Released by:



J. H. Baker, CAPT MC USN
OFFICER IN CHARGE
NavSubMedRschLab

ANNUAL PROGRESS REPORT ON
WORK UNITS ASSIGNED
NAVAL SUBMARINE MEDICAL RESEARCH LABORATORY

Research Area/Work Unit No.	Title	Page
<u>Physiology</u>		
MR041.01.01-0063BOKL	Physiological Effects of Excursion Dives from the Gas-Saturated State at Depths	
MR041.01.01-0125B9XX	Effect of Exposure to the Total Submarine Atmospheric Environment on Physiological Functions	
MR041.01.01-0130BXKK	A Visual Test of Fatigue and Physiological Disturbances in Navy Divers & Submariners . . .	
MR041.01.01-0139B9MK	Thyroid-Parathyroid Responses to Diving. . . .	
<u>Biochemistry</u>		
MR041.06.01-0026BXKK	Biochemical Mechanisms of Response to Environmental Stresses - Hyperbaric & Submarine	
<u>Clinical Medical Sciences</u>		
MR041.20.02-6024B3IJ	Effect of Submarine Service on Oral Health . . .	
MR041.20.02-6025B3IJ	Study of Oral Health in the Antarctic.	
<u>Selection for Special Environments</u>		
MF51.524.004-2002DX5G	Man as an Information Processor in Submarine and Diving Systems	
<u>Performance Limits Under Stress</u>		
MF51.524.002-5016DA5K	Psychophysiological Effects of Prolonged Exposure to the Environment of the Submariner and Diver	
MF51.524.004-9010DA5G	Optimization of Auditory Performance in Submarines	
MF51.524.004-9015DA5G	Vision under the Stresses found in Diving and Submarine Environments	
<u>Submarine Medicine</u>		
MF51.524.006-1002BF9I	Longitudinal Health Study-Submarine	
MF51.524.006-9025BA9K	Medical and Physiological Effects of Submarine Habitability, Escape and Rescue	
MF51.524.012-0010AG3I	Effects of Dental Aerosols on Operatory and Submarine Environment.	
MF51.524.012-0015AG3I	Study of Preventive Dental Principles & Methods in Military Populations	
MF51.524.012-0016AG3I	Longitudinal Health Study of Dental Disease . .	

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD DRSE (AR) 636 (3900)	
3. DATE PREV. SUMMARY 72 07 01*	4. KIND OF SUMMARY D. Change	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8a. DISB'N INSTR'N NL	8b. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
10. NO./CODES* PRIMARY		PROGRAM ELEMENT 61151N*		PROJECT NUMBER MR041.01		TASK AREA NUMBER .01	
						WORK UNIT NUMBER 0063BOKL	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U)Physiological Limits and Adaptation in Naval Saturation Dives Using Different Compression Schedules							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 00600 Escape and Survival; 012900 Physiology; 016200 Stress Physiology							
13. START DATE 65 01 01		14. ESTIMATED COMPLETION DATE CONT		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER: N/A				FISCAL YEAR		73*	
c. TYPE:				CURRENT		1.20*	
d. KIND OF AWARD:						12.0*	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME: Environmental Physiology Naval Submarine Medical Research Lab ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT MC USN* TELEPHONE: 203/449-3263; Autovon: 241-3263				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: SCHAEFER, Karl E., GS-15 TELEPHONE: 203/449-3410; Autovon: 241-3410 SOCIAL SECURITY ACCOUNT NUMBER:			
21. GENERAL USE				ASSOCIATE INVESTIGATORS NAME: MURRAY, R. D., LT(jg), MSC, USNR NAME: MESSIER, A. A., GS-9			
KEYWORDS (Precede FACH with Security Classification Code) (U)Excursion dives; (U)Gas saturation; (U)Man-in-the-Sea							
23. (U)Technical Objective: To investigate effects of saturation and excursion dives using different gas mixtures and different compression schedules on the performance of the respiratory, cardiovascular, metabolic and central nervous systems for the purpose of determining physiological limits of naval underwater operations.							
24. (U)Approach: Breath by breath monitoring by mass spectrometer of inspiratory and expiratory gas tensions (PO ₂ , PCO ₂ , PN ₂ , PHe and PNe). Pulmonary function, gas exchange and ECG measurements will be utilized and determinations of bone CO ₂ and calcium stores made. Various inspired gas mixtures and compression-decompression schedules will be tested.*							
25. (U)Progress: (Dec 71-Dec 72)Data obtained in recent NOAA-Ocean Systems-NSMRL saturation-excursion dives have revealed a new physiological sign of impending decompression sickness in the form of "nitrogen bursts" in the expired air following a complete wash-out while breathing O ₂ . Our studies have corroborated the existence of a metabolic source of nitrogen, which is still excreted after 24 hours in a helium-nitrogen atmosphere. Although small, this should be considered for a correction factor for decompression tables. Urinary calcium and CO ₂ data has been obtained to support the hypothesis that there is an increased bone blood flow associated with an increased influx of CO ₂ and calcium into the bone during compression. These metabolic processes are reversed during decompression. These studies continue to provide information leading to an assessment of Navy decompression tables. NSMRL Rpt. #687. "Involvement of CO ₂ and Calcium Stores in Decompression Sickness", 5th Symposium on Underwater Physiology. Preliminary Report, NOAA OPSI. Studies carried out in rats during saturation diving at 50 and 60 feet on air with ambient CO ₂ tensions of 3-4 mm Hg demonstrated the existence of a pronounced acidosis corresponding to the effects of 25-35 mm Hg of CO ₂ at normal atmospheric pressure.*							

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD FORM 636 (AR) 636 (3900)	
3. DATE PREV SUM'RY 72 07 01*	4. KIND OF SUMMARY D. Change	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8a. DISB'N INSTR'N NL	8b. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
10. NO/CODES: PROGRAM ELEMENT PRIMARY 61151N		PROJECT NUMBER MR041.01		TASK AREA NUMBER .01		WORK UNIT NUMBER 0125BOKL	
CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Effects of Exposure to the Total Submarine Atmosphere and Various Work-Rest Schedules on Physiological Functions							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 008800 Life Support; 016200 Stress Physiology							
13. START DATE 70 01		14. ESTIMATED COMPLETION DATE CONT		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:		EXPIRATION:		PRECEDING		b. FUNDS (In thousands)	
b. NUMBER: N/A				FISCAL YEAR 73*		0.45* 11.8*	
c. TYPE:		d. AMOUNT:		CURRENT 74*		0.45* 35.3*	
e. KIND OF AWARD:							
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME: Environmental Physiology Naval Submarine Medical Research Lab ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT MC USN* TELEPHONE 203/449-3263; Autovon: 241-3263				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: SCHAEFER, Karl E., GS-15 TELEPHONE 203/449-3410; Autovon: 241-3410 SOCIAL SECURITY ACCOUNT NUMBER:			
21. GENERAL USE				ASSOCIATE INVESTIGATORS NAME: MESSIER, A. A., GS-9 NAME: DOUGHERTY, J. H., Jr., GS-12			
KEYWORDS (Precede EACH with Security Classification Code) (U) Submarine Habitability; (U) Circadian Cycles; (U) Env. toxicity (U) Work-Rest Cycles; (U) Carbon monoxide; (U) CO ₂ ; (U) Calcium and phosphorus metabolism; (U) Ozone; (U) Hydrocarbons*							
23. TECHNICAL OBJECTIVE: 24. APPROACH. 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) Technical Objective: To determine whether 1) exposure to atmospheric contaminants in submarine and 2) unphysiological work-rest schedules have an impairing or stress effect on physiological functions and to carry out controlled laboratory experiments simulating exposure to individual contaminants of the submarine atmosphere and special work-rest schedules to validate results obtained in field experiments.							
24. (U) Approach: Studies are carried out periodically on patrols by submarine medical officers. Blood and urine specimens obtained on patrols are analyzed in the laboratory. Measurements of lung functions, acid base balance, plasma and red cell electrolytes, hemoglobin, hematocrits and calcium metabolisms are carried out before, during and after patrols.*							
25. Progress: (Dec 71-Dec 72) Studies carried out on patrol demonstrated that a 50 to 60 day exposure to the submarine atmosphere containing 0.7 to 1% CO ₂ has definite stress effects on 1) Acid base balance, 2) pulmonary function, 3) calcium phosphorus metabolism and 4) temperature regulation. The studies are presently summarized for an assessment of possible chronic stress effects of a 90 day exposure under the same conditions (Trident program). These studies are essential in order to make predictions about chronic toxicity caused by exposure to a submarine atmosphere for 90 days. These studies were used to recommend the reduction of CO ₂ limits from 0.7-1.0% to 0.5% maximum. Naval Submarine Medical Center Report Nos. 655, 656, 692, and 702 and three oral presentations at professional meetings.*							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY						1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL: MBOL	
							73 07 01*	DD DRGE(AR) 636(3900)	
3. PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INSTR'N	9. SPECIFIC DATA- CONTRACTOR ACCESS		9. LEVEL OF SUM	
72 07 01*	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		A. WORK UNIT	
10. NO./CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER		WORK UNIT NUMBER	
a. PRIMARY		61151N		MRO41.01		.01		.0130BXKK	
b. CONTRIBUTING									
c. CONTRIBUTING									
11. TITLE (Precede with Security Classification Code)* (U) A Visual Test of Fatigue and Physiological Disturbances in Navy Divers and Submariners									
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*									
016200 Stress Physiol.: 012400 Pers. Selec. & Maint.									
13. START DATE			14. ESTIMATED COMPLETION DATE			15. FUNDING AGENCY		16. PERFORMANCE METHOD	
70 08			CONT			DN		C. In-House	
17. CONTRACT/GRANT					18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YRS		b. FUNDS (in thousands)
a. DATES/EFFECTIVE:					PRECEDING				
b. NUMBER:* N/A					FISCAL YEAR		1973		1.75
c. TYPE:					CURRENT		1974		1.75
d. KIND OF AWARD:									37.2
19. RESPONSIBLE DOD ORGANIZATION					20. PERFORMING ORGANIZATION				
NAME:* Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS:* Box 600, Naval Submarine Base NLON Groton, Connecticut 06340					NAME:* Vision Branch Naval Submarine Medical Res. Lab. ADDRESS:* Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				
RESPONSIBLE INDIVIDUAL					PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)				
NAME: BAKER, J.H., CAPT MC USN *					NAME:* Kinney, J. A. S., Ph.D., GS-15				
TELEPHONE: (203)449-3263; Autocon: 241-3263					TELEPHONE: (203)449-3867; Autocon: 241-3867				
GENERAL USE					SOCIAL SECURITY ACCOUNT NUMBER:				
					ASSOCIATE INVESTIGATORS				
					NAME: McKay, C. L., MA, GS-11				
					NAME:				
22. KEYWORDS (Precede EACH with Security Classification Code) (U)Fatigue; (U) Visual tests; (U)Hyperbaric pressures; (U)Exotic atmospheres; (U)Electroencephalograms; (U) Cortical evoked responses									
23. TECHNICAL OBJECTIVE,* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)									
<p>23. (U) TECHNICAL OBJECTIVE: The onset of fatigue and physiological imbalance can often be predicted from visual symptoms, since the latter precede blackout and loss of consciousness. The aim of this research is to select and develop the most sensitive tests of incipient disability, for use in bio-instrumentation monitoring systems surveying the health and performance of Navy men in unusual environments.*</p> <p>24. (U) APPROACH: Previous research is used to select visual and neurophysiological functions that hold promise as predictors.* Techniques for measuring these functions are then developed and the measure assessed in environments which subject the individual to fatigue, pressure, cold, or other stresser.*</p> <p>25. (U) PROGRESS: (Dec 71 to Dec 72) One technique, the visual evoked cortical potential, has been successfully developed and is now being used to monitor divers for nitrogen narcosis in pressure chambers (see Work Unit MF51.524.004-9015DA5G). Techniques for recording and analyzing concomitant electroencephalographic activity (EEG) have also been developed and are being evaluated in assessing brain functioning. A new study has shown that neural adaptation or fatigue affects the normal ability to discriminate two visual events; this may allow a behavioral measure of other types of fatigue(NSMRL #709). Since some environments are potentially hazardous for human subjects, at least initially, both behavioral and electrophysiological measures are being worked out for use on animals.*</p> <p><u>Publications:</u> Luria, S.M., & Ryan, A.P. Masking as an indicator of neural fatigue: a preliminary study. NSMRL Rep. No. 709, May 1972. Kinney, J.A.S., et. al. Techniques for analysing differences in VERs: colored and patterned stimuli. <u>Vision Res.</u>12, 1733-1747, 1972. *</p>									

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY						1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
3. DATE PREV. SUMMARY	4. KIND OF SUMMARY	5. SUMMARY ACTIVITY	6. WORK SECURITY*	7. REGRADING*	8a. DISSEM INSTRN	73 07 01*		DD DR&E (AF)	636 (3000)
72 07 01*	D. Change	U	U	N/A	NL			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUMMARY A WORK UNIT
10. NO./CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER		WORK UNIT NUMBER	
A. PRIMARY		61102N		MR041.01		.01		0139B9MK	
B. CONTRIBUTING									
C. CONTRIBUTING									
11. TITLE (Precede with Security Classification Code) (U)Thyroid and Parathyroid Responses in the Physiological Adaptation to Saturation Diving									
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*									
012900 Physiology									
13. START DATE			14. ESTIMATED COMPLETION DATE			15. FUNDING AGENCY		16. PERFORMANCE METHOD	
72 07			74 06			DN		C. In-House	
17. CONTRACT/GRANT					18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS		b. FUNDS (In thousands)
A. DATES/EFFECTIVE:					PRECEDING				
B. NUMBER*					FISCAL YEAR		CURRENT		
C. TYPE:									
D. KIND OF AWARD:									
19. RESPONSIBLE DOD ORGANIZATION					20. PERFORMING ORGANIZATION				
NAME: Naval Submarine Medical Rsch. Lab Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340					NAME: Animal Sciences/Pathology Br. Naval Submarine Med. Rsch. Lab ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340				
RESPONSIBLE INDIVIDUAL					PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)				
NAME: BAKER, J. H., CAPT MC USN*					NAME: WOOD, D. H., MAJ USAF VC				
TELEPHONE: 203/449-3263; Auto: 241-3263					TELEPHONE: 203/449-3419; Auto: 241-3419				
GENERAL USE					SOCIAL SECURITY ACCOUNT NUMBER:				
					ASSOCIATE INVESTIGATORS				
					NAME: ADAMS, G. M., LT MSC USN				
					NAME:				
22. KEYWORDS (Precede EACH with Security Classification Code) (U)Thyroid Function; (U)Saturation Diving; (U)Parathyroid Function; (U)Thyroid Hormones; (U)Parathyroid Hormones									
23. TECHNICAL OBJECTIVE* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)									
23. (U)Technical Objective: The purpose of this work is to provide information on the role of the thyroid and parathyroid hormones in the physiological adaptation to saturation diving.									
24. (U)Approach: Groups of white rats will be continuously exposed to ambient air at 60 ft sea water pressure for periods up to five weeks. Animals will be serially sacrificed and serum samples and whole thyroid glands recovered. Thyroid function will be assessed by observing 24 hr. thyroid radioiodine uptake, circulating free thyroxine levels and the incorporation of radioiodine into the amino acid precursors of the active thyroid hormones. Parathyroid function will be observed by performing standard bioassay or immunoelectrophoretic procedures on serum samples collected at various times during compression and recompression. Parathyroid hormone, calcitonin and calcium ion concentrations will be determined.									
25. (U)Progress: (Dec 71-Dec 72). One hyperbaric and one sea level control exposure, each utilizing 55 rats, were completed during this period. Groups of 5 rats each were sacrificed at -7, 0, 1, 2, 3, 7, 14, 21, 28 and 35 days. Another group of 5 rats was decompressed after 35 days exposure and sacrificed after remaining at sea level for 7 days. The sea level control animals were kept in an environmental chamber adjusted to maintain the mean daily values for temperature, relative humidity and CO ₂ levels recorded during the hyperbaric exposure. Data are now being analyzed.*									

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD FORM 1498 (A.1.) 636 (3900)	
3. DATE PREV SUMMARY 2 07 01	4. KIND OF SUMMARY D. Change	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8. DISB'N INSTR'N NL	9. SPECIFIC DATA- CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
10. NO/CODES:*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		61151N		MR041.06		.01	
b. CONTRIBUTING						0026BXKK	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code) (U) Biochemical Responses to Stresses of Submarine and Diving Environments*							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 002300 Biochemistry; 010200 Stress Physiology; 005900 Environmental Biology*							
13. START DATE 64 01 01		14. ESTIMATED COMPLETION DATE CONT		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING			
b. NUMBER:*				FISCAL YEAR		b. FUNDS (In thousands)	
c. TYPE:				73		0.5	
d. KIND OF AWARD:				74		20.0	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Rsch. Lab. Naval Submarine Medical Center ADDRESS Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME: Biochemistry Branch Naval Submarine Med. Rsch. Lab. ADDRESS Box 600, Naval Submarine Base Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT MC USN TELEPHONE: 203/449-3263; Auto: 241-3263				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: TAPPAN, D. V., GS-13 TELEPHONE: 203/449-3410; Auto: 241-3410			
1. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: HEYDER, Elly, GS-11 NAME: SMITH, A. H., GS-7			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Enzymes; (U) Metabolic adaptation and regulation (U) Biochemistry of environmental stresses (Submarine & Diving)							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) Technical Objective: To evaluate and apply biochemical procedures for estimating and predicting the severity of short- and long-term stresses experienced by submarine and diving personnel engaged in operational pursuits.*							
24. (U) Approach: While employing biological samples from animals in preliminary investigations and utilizing blood chemistries for auxillary information, our current primary emphasis will center on evaluation of stress data obtainable from urine, the most readily obtainable biological material.*							
25. (U) Progress: (Dec 71 - Dec 72). Early correlation between the excretion of 17-ketosteroids, nitrogenous urinary metabolites and osmolarity have been verified and extended to include electrolytes, ketogenic steroids and hydroxysteroids. Extensive data are being analyzed to compare responses to normal, mildly stressed and highly stressed conditions. The potentiality of obtaining valid stress data from urine samples representing periods shorter than 24 hours has likewise been investigated experimentally and data are being evaluated. "Urinary Metabolic Indicators of Stress." by Tappan, D. V., Jacey, M. J. and Madden, R. (In preparation).*							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
				DN 640548	73 07 01	DD-DR&E (AR) 636 (3900)	
3. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INSTR N	9. SPECIFIC DATA CONTRACTOR ACCESS	
72 07 01	D. CHANGE	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO A. WORK UNIT	
NO/CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER		
a. PRIMARY		61151N	MR041.20	.02	6024B3IJ		
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)*							
(U) Effect of Submarine and Undersea Environments on Oral Health							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
005900 Environmental Biology; 003500 Clinical Medicine 012400 Personnel Selection and Maintenance (medical)							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
62 02		87 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE			
a. DATES/EFFECTIVE:				PRECEDING			
b. NUMBER:				FISCAL YEAR			
c. TYPE:				CURRENT			
d. AMOUNT:				FISCAL YEAR			
e. KIND OF AWARD:				FISCAL YEAR			
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab Naval Submarine Medical Center ADDRESS: Box 600 Naval Submarine Base New London Groton, Connecticut 06340				NAME: Dental Research Branch Naval Submarine Medical Rsch Lab ADDRESS: Box 600 Naval Submarine Base NLon Groton, Connecticut 06430 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT, MC, USN TELEPHONE: (203) 449-3263 Autovon: 241-3263				NAME: MAZZARELLA, M.A., CAPT DC USN TELEPHONE: (203) 449-3364 Autovon: 241-3364 SOCIAL SECURITY ACCOUNT NUMBER:			
21. GENERAL USE				ASSOCIATE INVESTIGATORS			
				NAME: EDEN, G.T., CDR DC USN NAME: ESQUIRE, R.G., LCDR DC USN			
22. KEY WORDS (Precede EACH with Security Classification Code)							
(U) Epidemiology; (U) Periodontal Health; (U) Dental Caries (U) Dental Barotrauma; (U) Saliva; (U) Calculus; (U) Diet; (U) Oral Disease							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) TECHNICAL OBJECTIVE. The aim of this work is to determine what influence submarine service has on oral health, what standards of oral health are necessary in submarine personnel, and to determine to what extent oral diseases may influence the effectiveness of submarine personnel.							
24. (U) APPROACH. Epidemiological surveys of submariners to evaluate periodontal health and dental caries. Dietary studies, including questionnaires and taste change analyses. Case histories and examinations of personnel experiencing dental barotrauma. Study of effects of FBM patrols and hyperbaric chambers on salivary components. Standardized collection of parotid saliva and evaluation of physiological correlates. Determination of calculus formation rate and chemical composition; longitudinal study of oral bacteria during patrols and hyperbaric chamber isolation periods. Evaluation control methods for prevention of dental problems on patrol.							
25. (U) PROGRESS (Dec 71 to Dec 72) When three divers were exposed to two weeks of living in experimental diving chambers set for shallow-water equivalent pressures at Ocean System Incorporated (OSI), Tarrytown, New York, extensive stomatological charting was performed, dental impressions taken, and daily paraffin-stimulated saliva collected. The fluctuations in saliva bacterial populations during the dive were not as great as variations which could be caused by normal oral-physiological manipulations. Erythematous areas surrounding vesicles comparable to aphthous lesions were observed in the soft palate of two of the divers following O ₂ inhalation for N ₂ "washout." Full arch maxillary dental casts have been prepared for dimensional analysis to contrast conditions of saturation and supersaturation.*							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
				DN 640548	73 07 01	DD-DR&E (AR) 636 (3900)	
3. DATE PREV SUM'RY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA CONTRACTOR ACCESS	
72 07 01	D. CHANGE	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO A. WORK UNIT	
9. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
PRIMARY		61151N		MR041.20		.02	
b. CONTRIBUTING						6025B3IJ	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)*							
(U) Study of Oral Health in the Antarctic							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
003500 Clinical Medicine; 005900 Environmental Biology; 016200 Stress Physiology							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
64 11		76 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:*				FISCAL YEAR			
c. TYPE: N/A				'73		0.4	
d. AMOUNT:				CURRENT		16.0	
e. KIND OF AWARD:				'74		0.4	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME:*				NAME:*			
Naval Submarine Medical Research Lab				Dental Research Branch			
Naval Submarine Medical Center				Naval Submarine Medical Rsch Lab			
ADDRESS:*				ADDRESS:*			
Box 600, Naval Submarine Base New London				Box 600, Naval Submarine Base NLon			
Groton, Connecticut 06340				Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J. H., CAPT, MC, USN				NAME: MAZZARELLA, M.A., CAPT DC USN			
TELEPHONE: (203) 449-3263 Autovon: 241-3263				TELEPHONE: (203) 449-3364 Autovon: 241-3364			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: ESQUIRE, R. G., LCDR DC USN			
				NAME: SHARROW, B. E., LCDR DC USN			
KEYWORDS (Precede EACH with Security Classification Code)							
(U) Stress (U) Periodontal Disease; (U) Dental Caries; (U) Oral Hygiene; (U) Epidemiological Survey; (U) Personnel Selection; (U) Saliva; (U) Preventive Dentistry							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE: Annual research programs are implemented delineating Antarctic stress factors which may affect the oral health of military personnel, evaluating methods of maintaining good oral health (particularly relative to periodontal dyscrasias), and correlating physiological alterations with studied fluctuations in oral biology.</p> <p>24. (U) APPROACH. The yearly rotation of associate investigators provides for a multidisciplinary approach involving longitudinal epidemiological surveys of oral disease for interrelating the effects of climate, diet, oral care motivation and work activity. Oral health factors are monitored during the isolation period as indicators of oral changes and relevance sought to overall physiology. Yearly accumulative data is retained at this activity to determine the predictability of dental problems in an isolated military environment and to evaluate preventive methods.</p> <p>25. (U) PROGRESS. (Dec 71 to Dec 72) Data collected from salivary isolates and oral health indices of Deep Freeze '71 personnel have been refined and are currently being subjected to a variety of statistical methods for factor analysis. Specimens of serologic and pharyngeal origin arrived in April and are currently being processed. Eighty percent of the post-deployment health questionnaires have been returned thus far. The Deep Freeze '72 Dental Officer has returned with data collected through the Austral winter on 80 subjects who were encouraged to take therapeutic amounts of ascorbic acid in single and in multiple vitamin preparations. Relationships between various oral parameters and lingual indophenol reduction times are being sought. The Deep Freeze '73 Dental Officer has deployed and is conducting a study dealing with patient motivation.*</p>							

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
					73 07 01	DD DR&E (AR) 636 3900	
3. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISSEM INSTR*	85. SPECIFIC DATA CONTRACTOR ACCESS	9. LEVEL OF SUM
72 07 01	D. Change	U	C	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
PRIMARY				MF51.524		004	
b. CONTRIBUTING						2002DX5G	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)*							
(U) Man as an Information Processor in Submarine and Diving Systems							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
0013400 Psychology; 007500 Human Factors Engineering; 009400 M/M Relations							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
69 07		CONT		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (in thousands)	
b. NUMBER:				FISCAL YEAR		1973	
c. TYPE:				CURRENT		2.0	
d. KIND OF AWARD:				1974		39.7	
19. RESPONSIBLE OOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME*: Naval Submarine Medical Research Lab.				NAME*: Human Factors Branch			
ADDRESS*: Naval Submarine Medical Center				ADDRESS*: Naval Submarine Medical Res. Lab.			
Box 600, Naval Submarine Base NLON				Box 600 Naval Submarine Base NLON			
Groton, Connecticut 06340				Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT. MC, USN				NAME*: Laxar, K.V., GS-11			
TELEPHONE: (203)449-3263; Autovon: 241-3263				TELEPHONE: (203) 449-3668, AUTOVON 241-3668			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: Olson, G., LT, MSC, USNR			
				NAME:			
KEYWORDS (Precede EACH with Security Classification Code) (U) Human information processing; (U) Decision making; (U) Proficiency measures & standards; (U) Performance under stress; (U) Submarine ASW							
23. (U) TECHNICAL OBJECTIVE. To (1) develop and evaluate techniques for measuring man's performance in sensing, interpreting, and storing information, and making decisions in undersea operations; (2) identify major sources of variability in performance and determine their relationship to the psychological functions described above; and (3) provide guides for organization, training, and equipment design of submarine and diving systems.							
24. (U) APPROACH. (1) analysis of performance of existing systems, (2) construction of computer models of human performance based on system analysis and basic data, (3) laboratory studies of specific hypotheses derived from (1) and (2) regarding particular information processing and decision-making behaviors. Empirical studies will employ psychological, environmental, or subsystem component simulations where appropriate. Where possible, validation studies relating findings of the preceding to performance in operational conditions will be conducted.							
25. (U) PROGRESS. (Dec '71 to Dec '72) Part I of the WSE report concerning graphic methods of target motion analysis was completed, NAVSUBMEDRSCHLAB Report #722 CONF. Several laboratory studies of performance on the expanded time bearing plot as related to the accuracy of target bearings and on man's ability to conceptualize relationships in geometric space as related to the solutions of fire control problems were conducted NAVSUBMEDRSCHLAB Report Nos. 716 and 725. Other studies have been completed, while further ones are in progress.							
Publications: NAVSUBMEDRSCHLAB Report No. 696 CONF.; Olson, G.M., & Laxar, K. Asymmetries in processing the terms "right" and "left". Journal of Experimental Psychology, in press.*							

*Available to contractors upon originator's approval.

DD FORM 1498 MAR 68 STOCK NO. 0102-014-9300

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

PLATE NO. 22378

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
					73 07 01*	DD DR&E (AR) 636 3900	
3. DATE PREV. SUM'RY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA CONTRACTOR ACCESS	9. LEVEL OF SUM
72 07 01	CHANGE	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
10. NO/CODES:*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		62711N		MF51.524		002	
b. CONTRIBUTING						5016DA5K	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Psychological and Physiological Effects of Prolonged Exposure to the Submarine Environment							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 006000 Escape, Rescue and Survival; 016200 Stress Physiology; 012400 Personnel Selection (Med.)							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
67 08 01		78 07 01*		DN		D. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:*				FISCAL YEAR		73	
c. TYPE:				CURRENT		1.0	
d. AMOUNT:				74*		44.9	
e. KIND OF AWARD:						2.0	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab.				Stress & Fatigue Evaluation Branch			
ADDRESS: Naval Submarine Medical Center				NAME: Naval Submarine Medical Res. Lab.			
Box 600, Naval Submarine Base NLON				Box 600, Naval Submarine Base NLON			
Groton, Connecticut 06340				ADDRESS: Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: Baker, J. H., CAPT MC USN*				NAME: Weybrew, B. B., GS-180-15			
TELEPHONE: (203) 449-3263; Autovon: 241-3263				TELEPHONE: (203) 449-3828; Autovon: 241-3828			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: Noddin, E. M., GS-180-09			
				NAME:			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Vigilance; (U) Hyperbaric Effects; (U) Response Analysis Tester; (U) Logical Inference Test; (U) Noise Exposure							
23. TECHNICAL OBJECTIVE: (U) To conduct laboratory and field studies designed to (a) identify the major stressors associated with the submarine environment; (b) to delineate the processes accounting for individual differences in tolerance for these stresses; and (c) to develop and test methods for prevention of, or relief from these effects (if they occur) so that crew effectiveness is maximized.							
24. Approach: (U) Goals (a) and (b) (item 23) are approached by means of multivariate psychometric techniques used both in laboratory and submarine underway studies to identify those environmental factors affecting the quality of the submariners' adjustment. Objective (c) (above) is approached by survey techniques used to delineate the causes of adjustment failure underway.							
25. Progress: (U) (Dec '71 - Dec '72). Two studies showed no acutely debilitating effects of exposure to high intensity sonar signals for 5 and 24 days, respectively. The etiology for submariners devolunteering is in part associated with certain habitability aspects of the submarine. Submariners disqualified for "sub" duty because of drug abuse tend to come from culturally sub-standard environments and to have personality test profiles (MMPI) similar to hospitalized drug patients. The officer validation sample for the Depression Proneness Scale has increased to (N=250) this CY.*							
Publications: (See attached sheet for details). Psychological effects of exposure to high intensity sonar signals, SMRL Rpts. 689 and 691; Etiology of Devolunteering, SMRL Rpt. 703; and Factors Related to Drug Abuse in Submariners, SMRL Rpt. 726 (in press).*							

*Available to contractors upon originator's approval.

DD FORM 1498 STOCK NO. 6102-014-9300

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

PLATE NO. 22378

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CATEGORY* 636 (3900)	
3. DATE PREV. SUMM'Y 72 07 01	4. KIND OF SUMMARY D. Change	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8. DISB'N INSTR'N NL	9. SPECIFIC DATA- CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER		
a. PRIMARY		62755N	MF51.524	.004	9010DA5G		
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Optimization of auditory performance in submarines							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 007500 Human factors engineering; 013400 Psychology							
13. START DATE 69 03		14. ESTIMATED COMPLETION DATE 79 06		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		19. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE: N/A				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:*				73		1.4	
c. TYPE:				FISCAL YEAR		54.0	
d. AMOUNT:				CURRENT		44.3	
e. KIND OF AWARD:				74		1.4	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base New London Groton, Connecticut 06340 RESPONSIBLE INDIVIDUAL NAME: BAKER, J.H., CAPT MC USN TELEPHONE: (A.) 241-3263				NAME: Auditory Research Branch ADDRESS: Naval Submarine Medical Rsch. Lab. Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: RUSSOTTI, J.S., GS-11 TELEPHONE: (A.) 241-3201 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: HARRIS, J. Donald, GS-15 NAME: MYERS, C.K., GS-12			
21. GENERAL USE							
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Audition; (U) Auditory displays; (U) Physiological correlates; (U) sonar operator performance							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.) 23. (U) TECHNICAL OBJECTIVE: To evaluate human performance on various parameters of hearing that relate to the optimal use of the auditory cues in undersea operations. To improve performance by recommending specifications for equipment or alterations of training procedures of the listeners utilizing the most sensitive detecting characteristics of the human ear. 24. (U) APPROACH. Efforts will be made to describe the critical hearing parameters that would insure optimal use of the auditory sense in submarine operations. The physical characteristics of the sound systems, i.e., sonar, radio, and the performance of operators on these systems will be studied. Investigation of hearing sensitivity and auditory vigilance by behavioral and electrophysiological means under varying conditions of complex auditory displays will be undertaken. Submarine sonar operator performance in detection of targets of varied spectral character will be evaluated in terms of NRD (recognition differential: the ratio of signal to noise at which 50% detectability of target is attained). Parameters critical to such performance will be specified and their quantitative effect on target detection determined. 25. (U) PROGRESS. (Dec 71 to Dec 72) Studies underway assess aural NRD: (1) on a specific target at periodic intervals during fatiguing periods of high contact density; (2) in terms of its range over relevant targets in the submarine class; (3) in relation to types of non-conductive hearing losses. A target injector has been designed for multiple detection & tracking capability. Studies have separated effects of tensor tympani from the stapedius. Experiments have been completed on the effects of high noise levels on sonar doppler & on auditory tracking of a signal under perceptual rearrangements. Publications: NSMRL Report Nos. 706, 707, 714, 715, and 723.							

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
				DN 840535	73 07 01*	DD DR&E(AR) 636 (3900)	
3. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INST'N	9. LEVEL OF SUM	10. SPECIFIC DATA- CONTRACTOR ACCESS
07 01*	D. Change	U	U	N/A	NL		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
10. U./CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
		62755N		MF51.524		004	
11. PRIMARY						9015DA5G	
12. CONTRIBUTING							
13. CONTRIBUTING							
14. TITLE (Precede with Security Classification Code)*							
(U) Vision Under the Stresses Found in Naval Diving and Submarine Environments							
15. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
007900 Industrial Medicine; 016200 Stress Physiology							
16. START DATE		17. ESTIMATED COMPLETION DATE		18. FUNDING AGENCY		19. PERFORMANCE METHOD	
68 08		75 08		DN		C. In-House	
20. CONTRACT/GRANT				21. RESOURCES ESTIMATE		22. PROFESSIONAL MAN YRS	
A. DATES/EFFECTIVE:				PRECEDING		B. FUNDS (in thousands)	
B. NUMBER:				FISCAL		1973	
C. TYPE:				YEAR		0.75	
D. AMOUNT:				CURRENT		67.0	
E. KIND OF AWARD:				1974		0.75	
19. RESPONSIBLE DOD ORGANIZATION				23. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME: Vision Branch Naval Submarine Medical Res. Lab. ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT MC USN*				NAME: Kinney, J. A. S., Ph.D., GS-15			
TELEPHONE: (203)449-3263; Autovon: 241-3263				TELEPHONE: (203)449-3867; Autovon: 241-3867			
24. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: Luria, S. M., Ph.D.; GS-14			
				NAME: McKay, C. L., MA, GS-11			
25. KEYWORDS (Precede EACH with Security Classification Code)							
(U)Visual performance; (U)Visual physiology; (U) Exotic atmosphere; (U)Hyperbaric pressures; (U)Confinement							
26. TECHNICAL OBJECTIVE* 27. APPROACH, 28. PROGRESS (Furnish individual paragraphs identified by number. Precedent of each with Security Classification Code.)							
23. (U)TECHNICAL OBJECTIVE: The aim is to determine the practical effects of stressful situations (such as hyperbaric pressure, exotic atmospheres, long-term confinement) found in submarine and diving duties on the ability to perform visual tasks. Potentially hazardous conditions will be described and safety measures sought.							
24. (U) APPROACH: Visual performance will be measured by a battery of tests which reflect functioning at different levels of complexity, from simple sensitivity tests to measures of visual motor coordination and complex cognitive-visual tasks. These performance tests will be supplemented by physiological measures of the state of the visual system. Significant changes occurring under any stressful situation will be pursued with animals subjected to increased stress.							
25. (U) PROGRESS: (Dec 71 to Dec 72) Visual evoked responses and electroencephalographs are being measured in a series of dives designed to investigate individual susceptibility to nitrogen narcosis and to test whether physiological adaptation to narcosis occurs. In one dive in NSMRL's chamber, these electrophysiological measures are being made concomitantly with behavioral and biochemical tests by other branches, on 16 divers. The same measures are being recorded repeatedly on divers in a saturation dive at Ocean Systems to assess adaptive possibilities. VEGs and EEGs were also recorded periodically from rats, with chronically implanted cortical electrodes, in a 35 day saturation dive on air at NSMRL. Four rhesus monkeys have been trained as subjects for a study of the effects of nitrogen narcosis on perception, learning and memory; these monkeys will also wear chronically implanted electrodes (post-doctoral fellowship). In the study of the effects of CO on visual functioning, 12 non-smokers have been tested for various visual abilities after breathing 200 ppm CO in air for three hours; no adverse effects were found.*							
*Publications: Two reports (NSMRL Nos. 705,727). * 11							

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACRONYM	2. DATE OF SUMMARY*	REPORT ORIGIN (AR)	
					73 07 01*	636 (3900)	
3. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISSEM INSTRN	9. SPECIFIC DATA- CONTRACTOR ACCESS	10. LEVEL OF SUM
2 07 01*	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		62755N		MF51.524		.006	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Longitudinal Health Study of Personnel Exposed to the Submarine Environment for Extended Periods.							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
003500 Clinical Medicine; 021900 Physiology; 012400 Pers Sel and Maint.							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
67 07		Cont.		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:*				73*		1.4	
c. TYPE:				FISCAL YEAR		CURRENT	
d. KIND OF AWARD:				74*		1.4	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME:*				NAME:*			
Naval Submarine Medical Research Lab.				Submarine Medicine Branch			
Naval Submarine Medical Center				Naval Submarine Medical Res. Lab.			
ADDRESS:*				ADDRESS:*			
Box 600, Naval Submarine Base NLon				Box 600, Naval Submarine Base NLon			
Groton, Connecticut 06340				Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT, MC, USN*				NAME: BAKER, J.H., CAPT, MC, USN*			
TELEPHONE: (203)449-3263; Autovon: 241-3263				TELEPHONE: (203)449-3263; Autovon: 241-3263*			
GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: TANSEY, W.A., LT, MC, USNR*			
				NAME: PARKER, J.W.			
22. KEYWORDS (Precede EACH with Security Classification Code)							
(U) Health Study of Operational Submarine Personnel							
23. TECHNICAL OBJECTIVE,* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE: To establish a continuing multiphasic medical survey of submarine personnel to ascertain health, medical and personality changes. Knowledge of physiologic systems and/or psychologic changes relative to this occupational exposure allows correcting the precipitating factors, or controlling the related biological mechanisms. This knowledge could also be a factor in protecting the government against false claims relative to damage to personnel arising from such exposure. Contribution to medical science relative to the effects of submarine environment exposure and relationship to the aging process may be a rewarding factor.</p> <p>24. (U) APPROACH: Organizing and establishing the clinical scope of the project, establishment and testing of methodology, organization of methods of handling and retrieval of data, coordination of participating disciplines and the organization of the cadres of subjects and controls.</p> <p>25. (U) PROGRESS: (Dec 71 to Dec 72) The Longitudinal Health Study system has been further consolidated to minimize the time required for each individual and the maximize the number of individuals to be processed in a given time frame. Computer programs for editing, storage and easy retrieval data in all phases have been compiled and are presently being tested at the New London Laboratory of the Naval Underwater Systems Center. At least 170 individuals have been completely processed through the program this year. The project is now technically equipped to anticipate the turnout of several hundred submariners through the next fiscal year.*</p> <p>Publications: NSMRL Report 733.</p>							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ABBREVIATION*	2. DATE OF SUMMARY*	DD-DR&E (AR) 636 (3900)	
3. DATE PREV. SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INSTR'N	9. SPECIFIC DATA CONTRACTOR ACCESS	10. LEVEL OF SUMMARY
72 07 01*	D. Change	U	U	NA	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
3. NO CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER		WORK UNIT NUMBER	
		62755N	MF51.524	006		9025BA9K	
a. PRIMARY							
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Medical and Physiological Effects of Submarine Habitability, Escape and Rescue.							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 016200 Stress Physiology; 07900 Ind (Occup) Medicine; 021900 Physiology							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
65 06 01		Cont.		DN 1		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		19. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				FISCAL YEAR		b. FUNDS (In thousands)	
b. NUMBER:*				73*		0.8	
c. TYPE:				74*		0.8	
d. KIND OF AWARD:						33.3	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMANCE ORGANIZATION			
NAME:*				NAME:*			
ADDRESS:*				ADDRESS:*			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT, MC, USN*				NAME: PARKER, J.W. *			
TELEPHONE: (203) 449-3263; Autovon: 241-3263				TELEPHONE: (203) 449-3896; Autovon: 241-3896			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: TANSEY, W.A., LT, MC, USNR*			
				NAME: SPHAR, R.L., CDR, MC, USN*			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Escape and Survival; (U) Decompression Sickness; (U) Pulmonary Physiology; (U) Closed Cabin Atmosphere; (U) Thermal Effects; (U) Survival*							
23. (U) Technical Objective: To investigate new methods, systems and equipment utilized for individual or multiple man escape and rescue from disabled submarines either submerged or surfaced; to enhance the survival of personnel while confined in the atmosphere of a disabled submarine, during the transport from this atmosphere to the surface of the sea, and during the subsequent period of exposure on the surface. This must include consideration of atmospheric contaminants, thermal loss, and effects of injury and illness.							
24. (U) Approach: Evaluation to be made of concepts and equipment in thermal protection, air supply, exposure protection, and protection from hostile marine life. Evaluation and testing of new equipment is carried out on operating submarines, in the open sea, and in high pressure chambers within the laboratory. Further support is given to studies related to submarine atmosphere control and related closed ecological environments on either an operating ship or under controlled laboratory conditions. To develop full scale mock-ups of the 588-class submarine escape trunk for testing of escape egress. To test further modifications of this equipment to increase the probability of successful escapes from continental shelf depths.							
25. (U) Progress: (Dec 71 to Dec 72) Progress was made in the areas of information exchange, literature search, design concept and facility planning. Representatives of the laboratory attended an Information Exchange Project, B-52, meeting in the U.K. At this meeting investigators made presentations on the subject of submarine escape for the purpose of information exchange. A notable milestone during this period was the holding of the International Workshop on Escape and Survival from Submersibles which was cosponsored by Naval Submarine Medical Research Laboratory and the Office of Naval Research. This meeting was attended by representatives of the U.K., Canada, Israel, India and Switzerland. Tape recordings of the entire workshop were made.*							

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
				DN 640548	73 07 01	DD-DR&E (AR) 636 (3900)	
3. DATE PREV. SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISSEM INSTRN	8d. SPECIFIC DATA CONTRACTOR ACCESS	
72 07 01	D. CHANGE	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
9. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		62755N		MF 51.524		.012	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)*							
(U) Effects of Dental Aerosols on Operatory and Submarine Environments							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
005900 Environmental Biology; 010100 Microbiology; 016800 Toxicology							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
		78 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		19. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING			
b. NUMBER:				FISCAL YEAR			
c. TYPE:				'73		0.4	
d. KIND OF AWARD:				CURRENT			
N/A				'74		0.4	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab Naval Submarine Medical Center ADDRESS: Box 600 Naval Submarine Base New London Groton, Connecticut 06340				NAME: Dental Research Branch Naval Submarine Medical Rsch Lab ADDRESS: Box 600 Naval Submarine Base NLon Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: MAZZARELLA, M.A., CAPT DC USN TELEPHONE: (203) 449-3364 Autovon: 241-3364 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: ESQUIRE, R.G., LCDR DC USN			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT, MC, USN TELEPHONE: (203) 449-3263 Autovon: 241-3263							
21. GENERAL USE							
22. KEYWORDS (Precede EACH with Security Classification Code)							
(U) Aerosols; (U) Aerobacteriology; (U) Dentistry (U) Dental Operatory; (U) Dental Equipment; (U) Environment; (U) Toxicology							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) TECHNICAL OBJECTIVE. The primary aim is development of methods for reduction of contamination hazards associated with airborne dissemination, transfer, or reentrainment of microorganisms and toxic products resulting from dental procedures and naso-oral manipulations in submarine, dental clinic, and underwater habitat environments.							
24. (U) APPROACH. Aerosol characteristics are being elucidated by: slit samplers to scribe on media a time tracing of the microbial atmospheric burden. Andersen stage-samplers to determine particle size distribution of bacteria and counters to survey particulate matter. Description and duration of dental procedures performed are logged to establish relationships between the procedure and amount, particle size, and extent of aerosol propagated. Relations between toothbrushing procedures and aerosol characteristics are being examined in submarine lavatories, in the 14-sink preventive dentistry room of this activity and hyperbaric diving chambers here and at other nearby diving facilities.							
25. (U) PROGRESS. (Dec 71 to Dec 72) Samples from an experimental dive in a hyperbaric chamber at Ocean Systems Inc., Tarrytown, New York, were obtained through a wall penetration without utilization of a vacuum pump and assayed with an Andersen stacked-sieve air sampler. Viable bacterial particulates within a size range of 1-5 μ (a potential inhalatory hazard) were recoverable from chamber air almost daily during the dive.							
Publications: Air Bacterial Burden in New and Old Dental Clinics. Mazzarella, M., Scheer, J.E. and Middleton, R.A. Abstracts 47th General Mtg of International Assoc for Dental Rsch, p. 176, 1971.							
Reentrainment of Bacterial Aerosols Disseminated by an Ultrasonic Dental Prophylaxis Unit. Mazzarella, M.A., and Scheer, J.E. Abstracts of the Annual Mtg of the American Society for Microbiology, E-154, p. 26, 1972.*							

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
				DN 640548	73 07 01	DD-DR&E (AR) 636(3900)	
3. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA- CONTRACTOR ACCESS	9. LEVEL OF SUM
72 07 01	D. CHANGE	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
10. CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		62755N		MF51.524		.012	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)*							
(U) Study of Preventive Dentistry Principles and Methods in Military Populations							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 003500 Clinical Medicine; 007800 Hygiene and Sanitation; 012400 Personnel Selection and Maintenance (medical)							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
66 01		75 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING			
b. NUMBER:*				FISCAL YEAR		7.0	
c. TYPE:				CURRENT		7.3	
d. KIND OF AWARD:				174		0.4	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab Naval Submarine Medical Center ADDRESS: Box 600 Naval Submarine Base New London Groton, Connecticut 06340				NAME: Dental Research Branch Naval Submarine Medical Rsch Lab ADDRESS: Box 600 Naval Submarine Base NLon Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: MAZZARELLA, M.A., CAPT DC USN TELEPHONE: (203) 449-3364 Autovon: 241-3364 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: ESQUIRE, R.G., LCDR DC USN			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT, MC, USN TELEPHONE: (203) 449-3263 Autovon: 241-3263							
21. GENERAL USE							
22. KEYWORDS (Precede FACII with Security Classification Code) (U) Preventive Dentistry; (U) Oral Hygiene, (U) Dietary Habits; (U) Evaluation techniques							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE. This work unit is concerned with developing and evaluating techniques and principles for improving oral health and preventing dental problems in military groups through improved oral hygiene. Evaluation techniques also are to be developed and tested. The aims will be, specifically, good oral health maintenance of submarine crews and other small isolated military groups, but results will be applicable to the military population as a whole.</p> <p>24. (U) APPROACH. Effects of oral hygiene techniques will be subjected to exacting evaluations for shore-based and submarine-based personnel. The study of contributing factors as devices, dexterity, education and motivation are used. Analysis of bacterial plaque, its effects and its control, is basic to this work unit. Factorial analysis of gingivitis control is studied by various methods.</p> <p>25. (U) PROGRESS (Dec 71 to Dec 72) Questionnaires submitted before and after different oral health instruction presentations have yielded several hundred data points. These data are currently being refined for further processing. A statistical matrix is concurrently being designed for interparametric evaluation.*</p>							

*Available to contractors upon originator's approval.

DD FORM 1498 STOCK NO. 0102-014-9300

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD-DR&E (AR) 636(3900)	
3. DATE PREV. SUM'Y 72 07 01	4. KIND OF SUMMARY D. CHANGE	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8. DISB'N INSTR'N NL	9. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	10. LEVEL OF SUM A. WORK UNIT
O/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		62755N		MF51.524		.012	
b. CONTRIBUTING						0016AG3I	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Longitudinal Study of Dental Diseases and Defects in Naval Personnel							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 003500 Clinical Medicine; 012600 Pharmacology; 005900 Environmental Biology							
13. START DATE 67 10		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:				FISCAL YEAR		'73	
c. TYPE:				CURRENT		0.4	
d. KIND OF AWARD:						7.0	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab Naval Submarine Medical Center ADDRESS: Box 600 Naval Submarine Base New London Groton, Connecticut 06340				NAME: Dental Research Branch Naval Submarine Medical Rsch Lab ADDRESS: Box 600 Naval Submarine Base NLon Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J. H., CAPT, MC, USN				NAME: EDEN, G. T., CDR, DC, USN			
TELEPHONE: (203) 449-3263 Autovon: 241-3263				TELEPHONE: (203) 449-3364 Autovon: 241-3364			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: ESQUIRE, R.G., LCDR, DC, USN			
				NAME: MAZZARELLA, M.A., CAPT, DC, USN			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Epidemiology; (U) Caries; (U) Periodontal Disease (U) Growth and Development; (U) Preventive Dentistry (U) Clinical Medicine							
23. TECHNICAL OBJECTIVE. 24. APPROACH. 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE. The objective of this work unit is to define the dental effects of normative aging and occupational stresses in Navy divers, submarine personnel, and other Navy subpopulations within the framework of routine Navy dental care.</p> <p>24. (U) APPROACH. Both longitudinal and cross-sectional studies are made of selected samples of the military population. Occupational subgroups within the naval service (especially divers) are examined to establish individual and group characteristics so that changes with time may be related to occupation, normative aging, and/or genotypic variation.</p> <p>25. (U) PROGRESS. (Dec 71 to Dec 72) (1) A study of Submarine School candidates which revealed that 40% of their occlusal surfaces are unfilled, caries free and in teeth without proximal caries provided the epidemiological justification for an active study evaluating polymeric pit and fissure sealants as a decay preventive in young naval personnel. (2) One hundred and fifty (150) divers and submarine personnel have been examined this year as part of the initial increment of the longitudinal dental health study. A partial analysis of the data on 80 of these personnel reveals a positive association between the amount of plaque (Greene and Vermillion scale 0-3) and the sulcus depth subjacent to the plaque. Of six teeth examined for plaque on each patient there is a negative correlation between the number teeth without plaque and the periodontal index of A.L. Russell.*</p>							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
				DN 640548	73 07 01	DD-DR&E (AR) 636(3900)	
3. DATE PREV SUMRY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA CONTRACTOR ACCESS	9. LEVEL OF SUM
72 07 01	D. CHANGE	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER		
a. PRIMARY		62755N	MF51.524	.012	0020AG3T		
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) An Evaluation of a Polymeric Pit and Fissure Sealant as a Dental Decay Preventive in Submarine Personnel							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 012400 Personnel Selection and Maintenance (Dentistry) 003500 Clinical Medicine, 002400 Bioengineering							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
72 07		74 02		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:				FISCAL YEAR			
c. TYPE:				'73		0.4	
N/A				CURRENT		9.0	
d. KIND OF AWARD:				'74		0.4	
						12.0	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base New London Groton, Connecticut 06340				NAME: Dental Research Branch Naval Submarine Medical Rsch Lab ADDRESS: Box 600 Naval Submarine Base NLon Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
RESPONSIBLE INDIVIDUAL				NAME: EDEN, G. T., CDR, DC, USN			
NAME: BAKER, J. H., CAPT, MC, USN				TELEPHONE: (203) 449-3364 Autovon: 241-3364			
TELEPHONE: (203) 449-3263 Autovon: 241-3263				SOCIAL SECURITY ACCOUNT NUMBER:			
21. GENERAL USE				ASSOCIATE INVESTIGATORS			
				NAME: MAZZARELLA, M. A., CAPT, DC, USN			
				NAME:			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Tooth Sealants; (U) Caries; (U) Preventive Dentistry; (U) Polymers; (U) Adhesion							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE: The objective of this study is to assess the decay preventive benefits to young U.S. Navy personnel resulting from the application to the fissured chewing surfaces of the teeth of a plastic film (pit & fissure sealant) now classified as provisionally acceptable by the American Dental Association. This procedure may provide a valuable supplement to the highly successful three-agent stannous fluoride treatments pioneered by the U.S. Navy Dental Corps at this activity which concentrate their effect on the smooth surfaces between the teeth. Since approximately 40% of the chewing (occlusal) surfaces of Submarine School candidates' teeth may benefit from the protection afforded by plastic sealants, a well-documented material reduction in new occlusal caries for these young servicemen would allow a significant enlargement of the total package of dental care presently offered by the U.S. Navy Dental Corps.</p> <p>24. (U) APPROACH. Approximately 325 subjects with appropriate matched pairs of posterior teeth will have one tooth in each pair coated with sealant (2000 teeth total). Re-examinations at six monthly intervals for two years will permit a comparison of the rates of new cavity formation in both treated and untreated teeth. Re-examinations will be facilitated through the use of Submarine School candidates as subjects since these personnel are characterized by greater duty stability (within the Submarine Force) and a smaller fixed number of home ports.</p> <p>25. (U) PROGRESS. (Dec 71 to Dec 72) Air drying and voltage monitoring equipment have been installed. The investigator has familiarized himself with the sealant material and the technique for its application. One thousand (1000) teeth in 166 subjects have been coated with plastic sealant and are available for re-examinations.</p>							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
					73 07 01*	DD-DR&E (AR) 636 (3900)	
3. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INSTR'N	9. SPECIFIC DATA CONTRACTOR ACCESS	9. LEVEL OF SUM
72 07 01*	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT*		PROJECT NUMBER		TASK AFTER NUMBER	
a. PRIMARY		62755N		MF51.524		014	
b. CONTRIBUTING						9015BA9K	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)*							
(U) Fatty Acid Metabolism in Decompression Sickness							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
005900 Environmental Biology; 002300 Biochemistry							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
72 07		75 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PREVIOUS		b. FUNDS (In thousands)	
b. NUMBER:*				73*		0.2	
c. TYPE:				FISCAL YEAR		CURRENT	
d. KIND OF AWARD:				74*		0.2	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME:*				NAME:*			
Naval Submarine Medical Research Lab.				Diving & Hyperbaric Medicine Br.			
Naval Submarine Medical Center				Naval Submarine Medical Res. Lab.			
ADDRESS:*				ADDRESS:*			
Box 600, Naval Submarine Base NLon				Naval Submarine Base NLon			
Groton, Connecticut 06340				Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT, MC, USN*				NAME: ADAMS, G.M., LT, MSC, USN			
TELEPHONE: (203) 449-3263; Autovon: 241-3263				TELEPHONE: (203) 449-3896; Autovon: 241-3896*			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: WILLIAMSON, R.A., LT, MC, USNR			
				NAME:			
22. KEYWORDS (Precede EACH with Security Classification Code)							
(U) Decompression Sickness; (U) Oxygen; (U) Lipid; (U) Fatty Acid							
23. (U) TECHNICAL OBJECTIVE: Intermittent oxygen breathing during the stage decompression of a saturation dive is a routine occurrence. While oxygen inhalation under these circumstances apparently permits a physical gas exchange that facilitates a safer decompression, the metabolic manifestations of the process are essentially unknown. The objective of this study is to ascertain the effect of oxygen breathing during stage decompression on fatty acid production and lipid metabolism.							
24. (U) APPROACH: The <u>in vivo</u> effect of intermittent oxygen breathing during stage decompression from air and helium saturation dives on the biosynthesis of various fatty acids will be investigated in a model animal system and humans. The subsequent distribution of fatty acids in lipids derived from germene and/or available tissues will be followed to determine the systemic effect of this oxygen exposure on lipid metabolism.							
25. (U) PROGRESS: (Dec 71 to Dec 72) The initial equipment procurement has been accomplished and analytical procedure trains are being established. Animal dive profiles are currently being established. Gas chromatograph analytical techniques are being developed.*							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA CONTRACTOR ACCESS	9. LEVEL OF SUM
2 07 01	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	DD DR&E (AR) 636 (3900)
10. NO./CODES:		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		62755 N		MF51.524.		014	
b. CONTRIBUTING						9016BA9K	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code) (U) Metabolic Factors Altering Mineral Metabolism During Exposure to Submarine and Diving Environments							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS 016200 Stress Physiology; 002300 Biochemistry; 005900 Environmental Biology							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
72 07		76 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:				FISCAL YEAR		73	
c. TYPE:				CURRENT		1.2	
d. KIND OF AWARD:				74		1.4	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Rsch. Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME: Biochemistry Branch Naval Submarine Med. Rsch. Lab. ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J. H., CAPT MC USN				NAME: HEYDER, Elly, GS-11			
TELEPHONE: 203/449-3263; Auto: 241-3263				TELEPHONE: 203/449-3410; Auto: 241-3410			
GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: TAPPAN, D. V., GS-13			
				NAME: JACEY, M. J., GS-11*			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Diving; (U) Mineral Metabolism; (U) Dysbaric osteonecrosis; (U) Stress; (U) Saturation Diving							
23. TECHNICAL OBJECTIVE: 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) Technical Objective: To evaluate the influence of pressure and decompression on mineral metabolism, distribution or loss in animals exposed to simulated diving routines and in Navy divers.*							
24. (U) Approach: Male rats will be subjected to a variety of increased pressure situations including prolonged exposures to pressurized air or artificial gas mixtures with both adequate and inadequate decompression schedules utilized. Blood, bone, urine and soft tissue samples will be analyzed for shifts in mineral and electrolyte distribution that might provide information concerning their role in decompression sickness, hematologic alterations following barotrauma and the etiology of dysbaric osteonecrosis. Urinary hydroxyproline, ⁴⁵ Ca ⁺⁺ , and ³² PO ₄ shifts will be studied to acquire information concerning the influences of bone metabolism and/or parathyroid hormone on the aforementioned syndromes. Samples from appropriate human dives will be analyzed when available.*							
25. (U) Progress: (Dec 71 - Dec 72) Blood and urine minerals and urinary hydroxyproline have been analyzed from young rats saturated at 50 FSW for 60 days and 60 FSW for 35 days in air while receiving low, normal, and high calcium diets. Samples from mature rats exposed to a series of rapid decompression profiles have also been analysed. Preliminary studies using ⁴⁵ Ca ⁺⁺ have shown an alteration in the movement of isotope among blood, bone and urine of young rats dived to 180'. Hydroxyproline and minerals were also analyzed from the urine of divers following multiple exposures to 2 and 7 ATA in air. The large quantities of data obtained require interpretation with the aid of an appropriate system for data analysis.							

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RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD DR&E (AR) 636 (3900)	
3. DATE PREV. SUMM'Y 72 07 01	4. KIND OF SUMMARY D. Change	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8a. DISB'N INSTR'N NL	8b. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		62755N		MF51.524		014	
b. CONTRIBUTING						9017BC6I	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U)The Effect of Chronic Exposure to Hyperbaric Environments on the Mammalian Host-Defense and Immunological Systems							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 005900 Environmental Biology; 010100 Microbiology; 003500 Clinical Medicine							
13. START DATE 72 07		14. ESTIMATED COMPLETION DATE 75 06		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT		18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS		b. FUNDS (In thousands)	
a. DATES/EFFECTIVE:		EXPIRATION:		PRECEDING			
b. NUMBER:* N/A				FISCAL YEAR 73		0.5	
c. TYPE:		d. AMOUNT:		CURRENT		30.1	
e. KIND OF AWARD:				74		0.5	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Rsch. Lab. Box 600, Naval Submarine Base NLO ADDRESS: Groton, Connecticut 06340				NAME: Ecology Branch Naval Submarine Med. Rsch. Lab ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J. H., CAPT MC USN				NAME: STEWART, S. D., LCDR MSC USN			
TELEPHONE: 203/449-3263; Auto: 241-3263				TELEPHONE: 203/449-4807; Auto: 241-4807			
GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME:			
				NAME:			
22. KEYWORDS (Precede EACH with Security Classification Code) (U)Hyperbaric Saturation; (U)Immunology; (U)Secretory Immunoglobulins; (U)Clearance; (U)Cellular Immunity							
23. TECHNICAL OBJECTIVE* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U)Objective: To determine the effects of chronic exposure to hyperbaric environments under conditions of saturation in air/inert gas oxygen environments on the mammalian host-defense and immunological systems.							
24. (U)Approach: Studies will be designed to investigate mammalian host-defense/immunological responses after periods of chronic exposure to hyperbaric environments under defined conditions of pressure, temperature and relative humidity. Animal studies will be conducted to examine stress effects of these environments on pulmonary/vascular clearance mechanisms and primary/secondary immune responses. Emphasis will be placed on stress effects on the conducting portions of the respiratory tract by study of anti-bacterial/viral defense mechanisms with regard to function change, associated morphological/biochemical changes and function recovery pre-, post- and during periods of exposure.							
25. (U)Progress: (July 72-Dec 73). Pulmonary/vascular clearance studies in rats exposed to air at 50 feet (52% O ₂) for periods up to 28 days showed no significant differences from control animals. Pulmonary tissue studies for light microscopy of animals so exposed are still in progress. Pulmonary tissue/alveolar macrophages and lung saline-extracts obtained from rats exposed to air at 60 feet (57% O ₂) for periods up to 35 days are still in progress. Serum, saliva and nasal washings have been obtained from divers exposed to 30 and then 90 feet in air (20% O ₂) for a total of 14 days. Quantitation of immunoglobulin, transfer proteins, protease inhibitors and complement/lysozyme are in progress. *							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORTING OFFICE (AR) 636 (3900)	
3. DATE PREV. SUM. 72 07 01*	4. KIND OF SUMMARY D. Change*	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8a. DISSEM INSTR'N NL	8b. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
1. NO/CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER		
PRIMARY		62755N	MF51.524	018	0001BA91		
b. CONTRIBUTING							
c. CONTRIBUTING							
13. TITLE (Precede with Security Classification Code)* (U) The Relationship Between Bone Density Changes in Diving and Aseptic Bone Necrosis.							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 0012600 Pharmacology; 016200 Stress Physiology 005900 Environmental Biology; 002300 Biochemistry							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
		Cont.		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER: N/A				FISCAL YEAR 73*		0.7	
c. TYPE:				CURRENT		50.2	
d. KIND OF AWARD:				74*		0.7	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLon Groton, Connecticut 06340				NAME: Diving & Hyperbaric Medicine Br. Naval Submarine Medical Res. Lab. ADDRESS: Naval Submarine Base NLon Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT, MC, USN *				NAME: ADAMS, G.M., LT, MSC, USN			
TELEPHONE: (203)449-3263; Autovon: 241-3263				TELEPHONE: (203)449-3896; Autovon: 241-3896*			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: MURRAY, R.D., LTJG, MSC, USNR			
				NAME:			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Calcitonin; (U) Fluid Dynamics; (U) Decompression Sickness; (U) Aseptic Bone Necrosis							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE: Bone density decreases have been documented after an inadequate decompression in a specific dive schedule, and a possible relationship between calcium homeostasis and decompression sickness has been demonstrated. The objectives of this study are: (1) To document the reported bone density decrease as a function of compression rate, depth and time at depth, and decompression rate; (2) To histologically examine bone from germane animals to determine the cellular changes occurring therein; and (3) To determine localized and systemic calcium interactions that may be related to decompression sickness.</p> <p>24. (U) APPROACH: Experimental animal models will be studied at simulated depths of 100, 1000, 2000 and 4000 feet. At least two compression schedules will be employed in conjunction with decompression schedules resulting in three general decompression sickness responses. These studies will be designed to determine bone density changes, measure fluid balance and determine fluid shifts, and ascertain calcium balance and determine localized tissue calcium distributions and interaction as a function of the dive profile.</p> <p>25. (U) PROGRESS: (Dec 71 to Dec 72) X-ray equipment has been procured to permit obtaining the required films for this evaluation. Techniques for evaluating tibia density shifts in humans have been developed and applied in one nitrox dive series. An animal chamber is being fabricated with a 3000 psig depth capability to permit experimentation at the proposed simulated depths. Techniques have been developed to optimize sampling and counting of radioactive histological tracers for determination of extracellular space and total body water.*</p>							

*Available to contractors upon originator's approval.

DD FORM 1498 MAR 68 STOCK NO. 0102-014-9300

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

PLATE NO. 22378

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	3. DATE PREV SUM* 72 07 01*		4. KIND OF SUMMARY D. Change		5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8. DISSEM INSTR* NL	9. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	10. LEVEL OF SUM A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER		WORK UNIT NUMBER							
a. PRIMARY				MF51.524		018		0004BF9K							
b. CONTRIBUTING															
c. CONTRIBUTING															
11. TITLE (Precede with Security Classification Code)* (U) Dysbaric Osteonecrosis in Divers*															
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 007900 Industrial Medicine; 016200 Stress Physiology; 05900 Environmental Biology; 01400 Radiobiology															
13. START DATE 65 09 01				14. ESTIMATED COMPLETION DATE Cont.				15. FUNDING AGENCY DN				16. PERFORMANCE METHOD C. In-House			
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE				a. PROFESSIONAL MAN YEARS				b. FUNDS (In thousands)			
a. DATES/EFFECTIVE:				EXPIRATION:				PRECEDING							
b. NUMBER* N/A								73*				0.6			
c. TYPE:				d. AMOUNT:				FISCAL YEAR				CURRENT			
								74*				0.3			
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION											
NAME* Naval Submarine Medical Research Lab. Naval Submarine Medical Center Box 600, Naval Submarine Base NLon Groton, Connecticut 06340				NAME* Diving & Hyperbaric Medicine Br. Naval Submarine Medical Res. Lab. Naval Submarine Base NLon Groton, Connecticut 06340											
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)											
NAME: BAKER, J.H., CAPT, MC, USN				NAME*: ADAMS, G.M., LT, MSC, USN											
TELEPHONE: (203)449-3263; Autovon: 241-3263				TELEPHONE: (203)449-3896; Autovon: 241-3896											
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:											
				ASSOCIATE INVESTIGATORS											
				NAME:											
				NAME:											
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Dysbaric Osteonecrosis; (U) Aseptic Bone Necrosis; (U) Hyperbaric Physiology															
23. (U) TECHNICAL OBJECTIVE: A preliminary retrospective evaluation of radiographs of U.S. Navy divers has suggested that a significant incidence of dysbaric osteonecrosis lesions are present in this group of individuals. Tentative observations of different groups of divers suggests a variable incidence dependent upon diver experience and/or classification. The objectives of this study are: (1) to determine the incidence of dysbaric osteonecrosis in various grouping of divers; and, (2) to continuously review the evolving data for insight into the etiology of dysbaric osteonecrosis. *															
24. (U) APPROACH: Various groups of divers will be radiographically surveyed according to a defined protocol at specified time intervals. The radiographs will be interpreted by qualified radiologists. Radiographs, interpretations and appropriate diving histories will be collated and systematically maintained for continuing comparison to future data acquisition on each diver. These records will be maintained in a central repository at the Naval Submarine Medical Research Laboratory. Periodic data reviews will ultimately define the incidence of this problem in the various groups of divers and the course of its occurrence in specific individuals.*															
25. (U) PROGRESS: (Dec 71 to Dec 72) A symposium on Aseptic Bone Necrosis was held at the Armed Forces Institute of Pathology in February 1972 with participants from the United States and Great Britain. A lesion classification system was adopted and survey protocol established. A computer documented filing system and thin-film copying capability are being established. The survey population expanded to provide information about the following diver groups -- saturation, first class, second class, scuba, HeO2, exceptional air, and divers previously incurring various diving accidents. *															

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY					1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL
					DN 740503	73 07 01*	DD DREG (AR) 636 (3900)
3. DATE PREV. SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8A. DISB'N INSTR'N	8B. SPECIFIC DATA - CONTRACTOR ACCESS	9. LEVEL OF SUM
72 07 01*	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
NO./CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER		WORK UNIT NUMBER	
a. PRIMARY		63771N	M4305	08		3001DAC9	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Development of Visual Screening, Display, and Illumination Standards for Submarine/Shipboard Personnel							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 012400 Pers.Selec.&Maint. (med); 009400 Man Machine Relations; 013300 Protective Equipment							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
67 07		75 07		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		A. PROFESSIONAL MAN YRS	
a. DATES/EFFECTIVE:				PRECEDING			
b. NUMBER:*				FISCAL YEAR		B. FUNDS (In thousands)	
c. TYPE:				1973		1.0	
d. AMOUNT:				CURRENT			
e. KIND OF AWARD:				1974		1.25	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME:* Naval Submarine Medical Research Lab Naval Submarine Medical Center				NAME:* Vision Branch Naval Submarine Medical Res. Lab.			
ADDRESS:* Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				ADDRESS:* Box 600, Naval Submarine Base NLON Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT MC USN *				NAME:* Paulson, H.M., GS-12			
TELEPHONE: (203)449-3263 Autocon: 241-3263				TELEPHONE: (203)449-3867 Autocon: 241-3867			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: Kinney, J.A.S., GS-15			
				NAME:			
22. KEYWORDS (Precede EACH with Security Classification Code) (U)Submarine medicine;(U)Color perception standards;(U)Eye-prot.equip.:(U)Visual standards;(U)Radiation;(U)Color coding;(U)Illumination							
23. TECHNICAL OBJECTIVE,* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE: To validate new visual screening, visual display, and shipboard illumination standards for submarine or fleet personnel so as to reduce manpower losses of otherwise qualified personnel, for problems of visual acuity and color vision; to enhance performance efficiency among personnel in various submarine work environments; and to prevent the development of defective vision among career submariners.</p> <p>24. (U) APPROACH: Experimental evaluation is made of (1) the performance efficiency on different tasks aboard ship among personnel varying in visual acuity and color perception; (2) means of eliminating or improving the physical characteristics of displays that require excessively high capabilities, and (3) various optical aids and devices designed to improve performance and protect the eye of the Navy man.</p> <p>25. (U) PROGRESS: (Dec 71 to Dec 72) An investigation of the effects of drugs on human color vision was instigated to determine if drugs interfered with the performance of duties and if color vision tests could be used to detect drug users. Normative data have been collected on a variety of subjective and objective tests of color vision and subjects using drugs are now being tested. A technique for detecting color defective individuals by means of the visual evoked cortical response has been developed and successfully tested. A study of eye movements in display monitoring is being planned; toward this end, a literature survey is underway and an apparatus for measuring eye movements is being tested. The color vision of boys in the local school system, who fail screening tests, is examined to determine the type and extent of their defect. This provides both a public service to local families and a supply of individuals with various types of defect for our research. A number of prototype and pre-production visors were tested and evaluated for Naval Air Systems Command.*</p>							

*Available to contractors upon originator's approval.

DD FORM 1498
1 MAR 68

STOCK NO.-0102-014-9300

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
					73 07 01	DD-DR&E (AR) 636 (3900)	
3. DATE PREV SUM'RY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA CONTRACTOR ACCESS	9. LEVEL OF SUM
72 07 01	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
CODES:		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		63771N		M4305		.08	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Development of auditory screening and acoustical tolerance standards for submarine/shipboard personnel							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 007500 Human factors engineering; 012400 Personnel selection & maintenance (Medical)							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
67 09		75 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE: N/A				PRECEDING		0.6	
b. NUMBER:				73		30.0	
c. TYPE:				FISCAL YEAR		CURRENT	
d. AMOUNT:				74		0.7	
e. KIND OF AWARD:						33.0	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340 RESPONSIBLE INDIVIDUAL NAME: BAKER, J.H., CAPT MC USN TELEPHONE: (A.) 241-3263				NAME: Auditory Research Branch ADDRESS: Naval Submarine Medical Rsch. Lab. Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: MYERS, C.K., GS-12 TELEPHONE: (A.) 241-3201 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: HARRIS, J. Donald, GS-15 NAME:			
21. GENERAL USE							
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Speech audiometry; (U) Hearing loss; (U) Physical defects							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.) 23. (U) TECHNICAL OBJECTIVE. To validate new audiometric standards for submarine personnel so as to enhance intelligibility of speech and signals among personnel in jobs requiring a high level of auditory acuity, to reduce numbers of submarine personnel, otherwise qualified, who are perhaps unnecessarily lost by reason of present auditory standards and to prevent the development of hearing defects among career submarine personnel. As needed, standards will be validated for surface ships. 24. (U) APPROACH. Experimental studies are conducted to assess auditory perception of a variety of speech materials and signal stimuli, embedded in various background sound fields, for personnel of differing levels of acuity determined by present standards. Longitudinal studies are conducted to assess changes in hearing abilities among submarine personnel as to identify predictive indices of hearing loss and the habituation process which enhances operator auditory acuity, the latter potential benefit in the design of training programs, auditory aids, or acoustical characteristics of submarine environment. 25. (U) PROGRESS. (Dec 71 to Dec 72) Data has been collected to evaluate the proficiency of several different speech reception tests. Four new tests of speech in noise and in quiet have been constructed. Five reports of this study have been submitted.* Publications: NSMRL Reports #704, 707, 719, 720, and 721.							

*Available to contractors upon originator's approval.

DD FORM 1 MAR 68 1498 STOCK NO. 0102-014-9300

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★ U.S. GOVERNMENT PRINTING OFFICE 1970-434-137/26

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
					73 07 01	DD-DR&E (AR) 636 (3900)	
SUMMARY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INSTR'N	9. SPECIFIC DATA- CONTRACTOR ACCESS	9. LEVEL OF SUM
07 01	D. Change	U	U, C	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
10. CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY		63771N		M4305		.08	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Development of damage risk criteria and habitability standards for exposure to sonar transmissions							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 007900 Industrial medicine; 001800 ASW; 012400 Personnel selection and maintenance (Medicine); 016200 Stress physiology							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
71 07		75 06		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:*				73		0.5	
c. TYPE:				FISCAL YEAR		20.0	
d. AMOUNT:				CURRENT		25.3	
e. KIND OF AWARD:				74		0.5	
19. RESPONSIBLE OOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME: Auditory Research Branch ADDRESS: Naval Submarine Medical Rsch. Lab. Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: SMITH, P.F., GS-13 TELEPHONE: (A.) 241-3201 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: HARRIS, J. Donald GS-15			
RESPONSIBLE INDIVIDUAL NAME: TELEPHONE:							
21. GENERAL USE							
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Sonar; (U) Hearing conservation; (U) Audition; (U) Noise pollution; (U) Environmental hazards							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) TECHNICAL OBJECTIVE. To develop hearing conservation standards for submariners exposed to intense tonal stimuli such as are transmitted to compartments within attack submarines by active sonar systems. To specify performance interference levels for sonar operation and other shipboard tasks. Further, to determine the habitability of ships' compartments subjected to prolonged and intense sonar signals.							
24. (U) APPROACH. Temporary auditory shifts and other physiological and behavioral changes resulting from controlled exposure to various sonar signal configurations will be measured. Effects of extraneous echo-ranging signals on sonar operations detection and classification performance will be measured. These data will form the bases of estimates of permanent hearing damage and performance interference levels which would result from routine exposure to such signals on various watch scheduled for typical cruise durations. Maximum permissible exposure conditions will be specified.							
25. (U) PROGRESS. (Dec 71 to Dec 72) The effects of high amplitude sonar signals transmitted by other echo-ranging ships and received by passive submarine sonar systems on sonar operations was investigated further. An experiment on the effects of extraneous echo-ranging on faint contact detection was executed. This work was funded, in part, by NUSC. Data collection has commenced on an experiment on the effects of pulse duration and inter pulse interval (recovery period) on temporary threshold shifts produced by exposure to airborne sonar signals. This work will yield data relevant to sonar habitability and sonar operator hearing damage in certain tactical situations.							
Publications: NSMRL Report #698(C); NSMRL Report #712(C); NSMRL Report #682(C); NSMRL Report #696(C); NSMRL Report #699(U).							

*Available to contractors upon originator's approval.

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RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ASSIGNMENT*	2. DATE OF SUMMARY*	DD FORM 1498 (1-70) 636 (3900)	
3. DATE PREV. SUMM'RY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING	8. DISB'N INSTR'N	9. LEVEL OF SUM	
72 07 01*	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO A. WORK UNIT	
10. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AND NUMBER	
a. PRIMARY		63776N		M4306		01	
b. CONTRIBUTING						2001BFM9	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Longitudinal Health Study of Personnel Exposed to Diving Hazards for Extended Periods.							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 007900 Industrial (Occup) Medicine; 003500 Clinical Medicine; 012900 Physiology; 012600 Pers Sel and Maint							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
72 07		Cont.		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				b. PRESENT		c. FUNDS (In thousands)	
b. NUMBER:*				73*		0.7	
c. TYPE:				74*		0.7	
d. KIND OF AWARD:						66.0	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME:*				NAME:*			
Naval Submarine Medical Research Lab.				Submarine Medicine Branch			
Naval Submarine Medical Center				Naval Submarine Medical Res. Lab.			
ADDRESS:*				ADDRESS:*			
Box 600, Naval Submarine Base NLon				Naval Submarine Base NLon			
Groton, Connecticut 06340				Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT, MC, USN,*				NAME: BAKER, J.H., CAPT, MC, USN*			
TELEPHONE: (203) 449-3263; Autovon: 241-3263				TELEPHONE: (203) 449-3263; Autovon: 241-3263*			
21. GENERAL USE				ASSOCIATE INVESTIGATORS			
				NAME: TANSEY, W.A., LT, MC, USNR*			
				NAME: PARKER, J.W. *			
22. KEYWORDS (Precede EACH with Security Classification Code)							
(U) Health Study of Operational Diving Personnel; (U) Multiphasic Medical Survey							
23. (U) TECHNICAL OBJECTIVE: To establish a continuing multiphasic medical survey of operational diving personnel to ascertain health, medical and personality changes. Knowledge of physiologic systems and/or psychologic changes relative to this occupational exposure allows correcting the precipitating factors, or controlling the related biological mechanisms. This knowledge could also be a factor in protecting the government against false claims relative to injury to personnel arising from such exposure. Contribution to medical science relative to the effects of the diving environment exposure and the relationship to the aging process may be a rewarding factor.							
24. (U) APPROACH: Organizing and establishing the clinical scope of the project, establishment and testing of methodology, organization of methods of handling and retrieval of data, coordination of participating disciplines and the organization of the cadres of subjects and controls.							
25. (U) PROGRESS: (Dec 71 to Dec 72). A total of 84 divers has been fully processed through the Longitudinal Health Study (LHS) program this year. The entire staff of the Escape Training Tank, Submarine Base, NLon, has been concluded as well as three groups of divers commencing training at the SubDevGroup ONE School of Saturation Diving and all hyperbaric personnel in NLon. Data has been stored in a computerized file awaiting analysis. A detailed NSMRL report (Report 733) defining the stages of the LHS exam is being prepared for imminent publication.*							
Publications: NSMRL Report No. 733							

*Available to contractors upon originator's approval.

DD FORM 1498 STOCK NO. 0102-014-9300

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

PLATE NO. 22378

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	DD FORM 1498 (APR 68) 636(3900)	
3. DATE PREV. SUMM'Y	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISSEM INSTR'N	8b. SPECIFIC DATA- CONTRACTOR ACCESS	9. LEVEL OF SUM
73 07 01*	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER		
a. PRIMARY		63776N	M4306	02	2110BAK9		
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)*							
(U) Vertical Excursion Diving Limits in the Naval Use of Saturation Diving							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
005900 Environmental Biology; 012900 Physiology; 016200 Stress Physiology							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
69 04		Cont.		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		19. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:				73		0.6	
c. TYPE:				FISCAL YEAR		32.2	
d. KIND OF AWARD:				CURRENT		34.2*	
19. RESPONSIBLE COD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base Nlon Groton, Connecticut 06340				NAME: Diving & Hyperbaric Medicine Br. Naval Submarine Medical Research Lab ADDRESS: Naval Submarine Base Nlon Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT, MC, USN*				NAME: WILLIAMSON, R.A., LT, MC, USNR*			
TELEPHONE: (203)449-3263; Autovon: 241-3263				TELEPHONE: (203)449-3896; Autovon: 241-3896			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: ADAMS, G.M., LT, MSC, USN*			
				NAME: TANSEY, W.A., LT, MC, USNR*			
22. KEYWORDS (Precede EACH with Security Classification Code)							
(U) Decompression; (U) Saturation Diving; (U) Underwater Physiology; (U) Excursion Diving							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) TECHNICAL OBJECTIVES: (1) To develop an effective animal model in saturation diving which could be used for mathematical extrapolation to human saturation diving, (2) to employ techniques to characterize the biomedical effects of pressure, and (3) to employ the newer research developments to more clearly define the spectrum of decompression signs and symptoms and their sequelae.*							
24. (U) APPROACH: Using animals of varying size, weight and species, common factors controlling excursion, ascent and no-decompression limits, will be identified. This data will then form the basis for calculation of saturation and non-saturation schedules.*							
25. (U) PROGRESS: (Dec 71 to Dec 72) A detailed protocol for the hematologic studies to be carried out with Chelsea Blood Laboratory has been completed. A life-support system for the relocated spherical chamber is being conceived.*							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD DR&E (AR) 636 (3900)	
3. DATE PREV. SUMMRY 72 07 01	4. KIND OF SUMMARY D. Change	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8a. DISSEM INSTRN NL	8b. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER		
a. PRIMARY		63776N	M4306	.02	5002BAM9		
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Modification and Experimental Application of High Pressure Metabolic Reaction System for use in Naval Diving Medical Rsch.							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 002300 Biochemistry; 016200 Stress Physiol.; 005900 Environmental Biology							
13. START DATE 72 07		14. ESTIMATED COMPLETION DATE 77 06		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING			
b. NUMBER:*				FISCAL YEAR		b. FUNDS (In thousands)	
c. TYPE:				73		1.2	
d. KIND OF AWARD:				74		46.8	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Rsch. Lab Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME: Biochemistry Branch Naval Submarine Med. Rsch. Lab ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: SMITH, Alex, GS-7 TELEPHONE: 203/449-3410; Auto: 241-3410 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: JACEY, M. J., GS-11 NAME: TAPPAN, D. V., GS-13			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT MC USN TELEPHONE: 203/449-3263; Auto: 241-3263							
22. KEYWORDS (Precede EACH with Security Classification Code) (U) High Pressure Physiology; (U) Stress Physiology; (U) Biochemical Reactions Under Pressure							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.) 23. (U) Technical Objective: To perform necessary modification and integrate high pressure metabolic reaction system into programs oriented toward solution of unanswered problems of Naval diving medical research. 24. (U) Approach: The high pressure reaction vessel system is under a continuing process of modification designed to adapt it to an expanding high pressure biochemical research program. Experiments utilizing the high pressure reaction system linked with gas chromatography, spectrophotometry, chemical analysis, and other research methods are in various stages of completion. Both whole tissue preparations and simplified biological reaction mixtures are studied in these experiments. Efforts are in progress for measuring metabolic effects under pressure and for studying membrane transport phenomena through the use of specific ion electrodes. Improved methods for data collection from the high pressure reaction system will be sought along with better methods of storing and treating the acquired information.* 25. (U) Progress: (Dec 71-Dec 72). Preliminary experiments involving enzyme reactions in erythrocytes under pressure have been completed. Successful procedures for pressurizing and depressurizing erythrocytes without disrupting the integrity of the cells have been developed and utilized. Several design changes in the original high pressure reaction system have been completed and others are underway. NAVSUBMEDRSCHLAB Report #713, 1972.*							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD FORM (AR) 636 (3900)	
3. DATE PREV SUMMARY 72 07 01	4. KIND OF SUMMARY D. Change	5. SUMMARY SCTY* U	6. WORK SECURITY* U	7. REGRADING* N/A	8a. DISB'N INSTR'N NL	8b. SPECIFIC DATA CONTRACTOR ACCESS <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	9. LEVEL OF SUM A. WORK UNIT
10. NO/CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER		
a. PRIMARY		63771N	M4306	.02	5003BAK9		
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U)Metabolic Effects of Practical and Simulated Diving Conditions and of Work Under High Pressure							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 002300 Biochemistry; 016200 Stress Physiology; 005900 Environmental Biology							
13. START DATE 72 06		14. ESTIMATED COMPLETION DATE 75 06		15. FUNDING AGENCY DN		16. PERFORMANCE METHOD C. In-House	
17. CONTRACT/GRANT				18. RESOURCE ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER:*				FISCAL YEAR		73	
c. TYPE:				CURRENT		1.1	
d. KIND OF AWARD:				74		1.1	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Rsch. Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NOLON Groton, Connecticut 06340				NAME: Biochemistry Branch Naval Submarine Med. Rsch. Lab ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: JACEY, M. J., GS-11 TELEPHONE: 203/449-3410; Auto: 241-3410 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: HEIDER, Elly, GS-11 NAME: TAPPAN, D. V., GS-13			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J. H., CAPT MC USN TELEPHONE: 203/449-3263; Auto: 241-3263							
21. GENERAL USE							
22. KEYWORDS (Precede EACH with Security Classification Code) (U)Diving; (U)Underwater Work; (U)Stress Effects							
23. (U)Technical Objective: To define in men and animals indices and processes that are affected by saturation and non-saturation dives for providing more objective ways of assessing detrimental effects of pressure and decompression and for minimizing detrimental effects of working in submarine and diving environments.*							
24. (U)Approach: Pressure/decompression studies in animals will be continued employing standardized diving schedules worked out in the course of our experiments. Investigations regarding the underlying mechanisms reflected by hematologic responses to decompression stress that we have observed which include alterations in coagulation processes. Biochemical responses reflected by changes in levels of tissue metabolites as a result of pressure/decompression stresses will be examined.*							
25. (U)Progress: (Dec 71-Dec 72) Metabolic and hematologic parameters have been studied in mature rats exposed to pressures corresponding to 50 FSW in air for 60 days and in an extensive series of animals subjected to severe decompression stress after pressurization to 300 FSW. Hemoglobin concentration and hematocrit values were observed to decrease progressively during the extended air-saturation exposure. Acute and latent hemoconcentration episodes were observed in the rats suffering decompression stress with an anemia-like response occurring at about 3 days post-decompression. NAVSUBMEDRSCHLAB REPORT entitled "Hematological Responses to Severe Decompression Stress" (In Preparation), by Jacey, M.J. et al, Submitted paper to Aerospace Medical Association, November 1972 entitled "Responses to Severe Decompression Stress" by Jacey, M. J. et al.*							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD DR&E (AR) 636(3900)	
3. DATE PREV. SUM'RY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INSTR'N	9. SPECIFIC DATA CONTRACTOR ACCESS	10. LEVEL OF SUM.
72 07 01*	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
1. NO/CODES*	PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER			
a. PRIMARY	63771N*	M4306	.02	7060BAK9			
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code) (U) Regulation of Respiration, Circulation, and Body Temperature at Rest and During Exercise in Navy Diving Operations							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
005900 Environmental Biology; 016200 Stress Physiology							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
69 12 01		CONT		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		19. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDE		b. FUNDS (In thousands)	
b. NUMBER: N/A				FISCAL YEAR		c. FUNDS (In thousands)	
c. TYPE:				73*		0.85	
d. AMOUNT:				74*		43.0	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Rsch. Lab. Naval Submarine Medical Center ADDRESS: Box 600, Naval Submarine Base NLO Groton, Connecticut 06340				NAME: Environmental Physiology Br. Naval Submarine Med. Rsch. Lab. ADDRESS: Box 600, Naval Submarine Base Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J. H., CAPT MC USN*				NAME: DOUGHERTY, J. H., JR., GS-12			
TELEPHONE: 203/449-3263; Autovon: 241-3263				TELEPHONE: 203/449-3410; Auto: 241-3410			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER: 456-52-2854*			
				ASSOCIATE INVESTIGATORS			
				NAME: SCHAEFER, K. E., GS-15			
				NAME: MESSIER, A. A., GS-9*			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Underwater physiology; (U) Hyperbaric; (U) O ₂ toxicity; (U) CO ₂ intoxication; (U) Thermal balance; (U) Biomedical inst.							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
23. (U) Technical Objective: To determine the influence of increased gas pressure and density in naval diving operations on the regulation of respiration, circulation, and thermal balance during both rest and exercise and evaluate the influence of training in naval diving on maximal work capacity under pressure and susceptibility to hyperbaric effects.							
24. (U) Approach: Studies of respiratory, circulatory, and body temperature responses of trained and untrained divers at normal and increased pressures of air, He-O ₂ , and Ne-O ₂ . Variables may include compression rate, gas composition, pressure, dry and wet environment and breathing mixtures, temperature of environment and breathing media, exertion level, experience of diver, thermal protection. Develop improved instrumentation and methods for applications in respiratory physiology under constraints of diving and exposure to a hyperbaric environment.							
25. (U) Progress: (Dec 71- Dec 72). Studies have been made during twenty of the NAVSUBMEDRSCHLAB air dives to 2 and 7 ATA with the mass spectrometer. Breath by breath monitoring of inspiratory and expiratory gases (O ₂ , CO ₂ , N ₂ , Ar) was carried out. Data analysis is in progress and an attempt to correlate N ₂ values with calculations of Workman's tissue values will be made. In the 3 cases with bends, burst of nitrogen appeared in the expired air following a complete initial washout curve while breathing oxygen. NAVSUBMEDRSCHLAB Reports #676, 729, 938 and Schaefer, K. E and Robert D. Allison. The Effects of Simulated Breath-holding Dives in the Dry and Wet Chamber on Blood Shifts into the Thorax. Preprints of Scientific Program of Aerospace Medical Assoc., pg. 181, Bal Harbour, Fla., May 8-11, 1972.*							

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ASSIGNMENT*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD FORM 1300 (AR) 636 3900	
3. DATE PREVIOUS SUMMARY	4. KIND OF SUMMARY	5. SUMMARY CATEGORY	6. WORK SECURITY*	7. REGRADING*	8. DISPOSITION*	9. SPECIFIC DATA CONTRACTOR ACCESS	10. LEVEL OF SUM
72 07 01	D. Change	U	C	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	A. WORK UNIT
11. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
				M4306		03	
12. PRIMARY						1020DXC5	
13. CONTRIBUTING							
14. CONTRIBUTING							
15. TITLE (Precede with Security Classification Code)*							
(U) Development of Diver Performance Measurement Methods.							
16. SCIENTIFIC AND TECHNOLOGICAL AREAS* 007500 Human Factors Engineering; 009400 Man Machine Relationships; 005900 Environmental Biology							
17. START DATE		18. ESTIMATED COMPLETION DATE		19. FUNDING AGENCY		20. PERFORMANCE METHOD	
67 12		76 12		DN		C. In-House	
21. CONTRACT/GRANT				22. RESOURCE ESTIMATE		23. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (In thousands)	
b. NUMBER: N/A				1971		1.1	
c. TYPE:				CURRENT		60.3	
d. KIND OF AWARD:				1974		1.1	
24. RESPONSIBLE DOD ORGANIZATION						58.5	
NAME: Naval Submarine Medical Research Lab. ADDRESS: Naval Submarine Medical Center Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				25. PERFORMING ORGANIZATION			
RESPONSIBLE INDIVIDUAL				NAME: Human Factors Branch ADDRESS: Naval Submarine Medical Res. Lab. Box 600 Naval Submarine Base NLON Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J.H., CAPT. MC, USN TELEPHONE: (203) 449-3263; Autovon: 241-3263				NAME: Moeller, G., GS-15 TELEPHONE: (203) 449-3668; Autovon: 241-3668 SOCIAL SECURITY ACCOUNT NUMBER:			
26. GENERAL USE				ASSOCIATE INVESTIGATORS			
				NAME: Chertin, C., GS-11 NAME:			

27. KEYWORDS (Precede with Security Classification Code) (U) Performance Measurements; (U) Deep-sea Diving; (U) Saturation Diving; (U) Underwater Manned Operations.

28. TECHNICAL OBJECTIVE, 29. APPROACH, 30. PROGRESS (Furnish individual paragraphs identified by number. Precede each with Security Classification Code.)

23. (U) TECHNICAL OBJECTIVE: To develop reliable methods for measuring performance among Navy swimmers and divers in underwater environments, such methods to be used for on-line monitoring of performance efficiency to serve as indicators of incipient disability, and for evaluating diving systems design.

24. (U) APPROACH: Experimental evaluation will be made of existing, and new, performance monitoring systems, particularly those related to psychomotor and problem-solving tasks, with attention given to reliability of measurement, combined effects of task-induced and physical stress, sensitivity to change in diver motivation or physical conditions, and utility in different diving environments (such as hyperbaric habitations or open-water).

25. (U) PROGRESS: (Dec '71 - Dec '72) Systematic evaluation of adaptive tracking and mental arithmetic tasks as indices of performance capability under hyperbaric conditions was initiated with test of 8 divers under 2 and 7 ATA air exposures. The tracking task produced clear evidence of narcosis and that effect decreased on a second exposure to 7 ATA air spaced 7-21 days later. No clear narcotic effects were obtained for the two mental arithmetic tasks. Subsequently, an abbreviated version of the adaptive tracking task yielded analogous results in the Ocean Systems Inc. 30-90 ft saturation-excursion dive. In preparation for hyperbaric studies of an animal model, decompression schedules for 200ft/30 min and 300ft/25 min air exposures were tested with four squirrel monkeys and training of three additional animals in delayed-matching-to-sample was substantially completed.*

Publications: Gell, C.F., & Moeller, G. The biodynamics of low altitude, high speed flight. Ergonomics, in press. Laxar, K. NAVSUBMEDRSCHLAB Report No. 696 CONF *

*Available to contractors upon originator's approval.

DD FORM 1 MAR 68 1498 STOCK NO. 6103-014-9300

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

PLATE NO. 22378

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*		3. REPORT NUMBER (AK)	
				73 07 01	73 07 01		636 (3900)	
3. DATE PREV SUM'RY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA CONTRACTOR ACCESS	8c. LEVEL OF SUM	A. WORK UNIT
72 07 01	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
10. CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER		WORK UNIT NUMBER
a. PRIMARY		63776N		M4306		.03		2020DAC5
b. CONTRIBUTING								
c. CONTRIBUTING								
11. TITLE (Precede with Security Classification Code)* (U) Evaluation of verbal communication by navy divers and swimmers and of sensory aspects of inter-submarine communications								
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*								
003900 Communications; 013400 Psychology; 008800 Life support								
13. START DATE			14. ESTIMATED COMPLETION DATE			15. FUNDING AGENCY		16. PERFORMANCE METHOD
67 09			73 06			DN		C. In-House
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS		b. FUNDS (In thousands)
a. DATES/EFFECTIVE: N/A				PRECEDING				
b. NUMBER:*				73				
c. TYPE:				FISCAL YEAR				
d. AMOUNT:				CURRENT				
e. KIND OF AWARD:								
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION				
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center				NAME: Auditory Research Branch				
ADDRESS: Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				ADDRESS: Naval Submarine Medical Rsch. Lab. Groton, Connecticut 06340				
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)				
NAME: BAKER, J.H., CAPT MC USN				NAME: SERGEANT, Russell L., GS-13				
TELEPHONE: (A.) 241-3263				TELEPHONE: (A.) 241-3201				
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:				
				ASSOCIATE INVESTIGATORS				
				NAME:				
				NAME:				
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Swimmer/diver communication; (U) Helium speech; (U) Underwater verbal comm; (U) Speech recep.; (U) Inter-sub voice comm; (U) Speech Prod								
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)								
23. (U) TECHNICAL OBJECTIVE. To evaluate various components of underwater communication equipment and the ability of Naval swimmers and hard-hat divers to speak in all types of underwater environments. To determine specifications for minimal communication systems from the point of talker and listener requirements for Navy personnel who work in any of the varied underwater environments. The basic objective was rather broad in that it sought to improve abilities of Navy personnel to communicate in submarines, underwater, in deep submergence operations, and in vehicles and underwater habitations.								
24. (U) APPROACH. Identification was sought of factors which reduce the ability of divers and swimmers to communicate by voice. Observations and evaluations were made of speech produced within hyperbaric atmospheres and situations wherein the hard-hat diver and free-swimmer may be expected to work. Work on this unit was phased out June, 1973.								
25. (U) PROGRESS. (Dec 71 to Dec 72) Proceedings of a Helium Speech Workshop were edited and published. Effects of shouted speech within a noisy hard-hat was investigated. One "Hydrox Speech" study was completed, another designed. Problems in submarine voice communications were reviewed and a new work unit proposed. The question of talker variability was studied, an experimental study designed, and speech tests were produced for presentation to panels of listeners. Publications: NSMRL Reports Nos. 693, 695, 700, 701, and 708.								

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL	
				DN 940502	73 07 01*	DD DR&E(AR) 636(3900)	
3. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY CITY*	6. WORK SECURITY*	7. REGRADING*	8. DISB'N INSTR'N	9. LEVEL OF SUMMARY A. WORK UNIT	
72 07 01	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO B. SPECIFIC DATA - CONTRACTOR ACCESS	
10. CODES*		PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER		WORK UNIT NUMBER	
a. PRIMARY		63776N	M4306	03		2050DXC5	
b. CONTRIBUTING							
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Evaluation of Sensory Aids and Training Procedures on Navy Divers' Visual Efficiency							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*							
008800 Life Support							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
68 09		76 06*		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YRS	
a. DATES/EFFECTIVE:				PRECEDING		b. FUNDS (in thousands)	
b. NUMBER:				FISCAL YEAR			
c. TYPE:				1973		0.75	
d. AMOUNT				CURRENT		55.7	
e. KIND OF AWARD:				1974		0.75	
50.3							
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME: Naval Submarine Medical Research Lab				NAME: Vision Branch			
ADDRESS: Naval Submarine Medical Center				ADDRESS: Naval Submarine Medical Research Lab			
Box 600, Naval Submarine Base NLON				Box 600, Naval Submarine Base NLON			
Groton, Connecticut 06340				Groton, Connecticut 06340			
RESPONSIBLE INDIVIDUAL				PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
NAME: BAKER, J. H., CAPT MC USN*				NAME: Luria, S. M., Ph.D., GS-14			
TELEPHONE: (203)449-3263; Autovon 241-3263				TELEPHONE: (203)449-3867; Autovon 241-3867			
21. GENERAL USE				SOCIAL SECURITY ACCOUNT NUMBER:			
				ASSOCIATE INVESTIGATORS			
				NAME: Kinney, J. A. S., Ph.D., GS-15			
				NAME: Ferris, S. H., Ph.D., GS-11			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Underwater lights; (U) Face masks; (U) Adaptation to distortion; (U) Refraction of light underwater.							
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) TECHNICAL OBJECTIVE: The diver's ability to see and orient himself visually underwater often becomes a major consideration in determining whether or not he can function effectively. Exploratory research has indicated that a number of distinct means, inclusive of visual aids and work procedures, may be directed to improving underwater visibility. This work unit will test these specific new devices and procedures.</p> <p>24. (U) APPROACH: As new underwater light sources are developed, they will be tested and their effectiveness compared with natural illumination and with other more common sources. Various techniques for overcoming refraction at the air-water interface of the diver's mask will be tried; i.e., optically corrected masks, behavioral compensation, or relearning of hand-eye coordination by the diver. Optical aids, such as contact lenses, polaroid filters, will be tested for their usefulness in determining underwater glare and general ability to decrease light dispersion in the water.</p> <p>25. (U) PROGRESS: (Dec 71 to Dec 72) A comprehensive study of visual functioning through five different types of commercially available facemasks was made. The measures, visual acuity, stereoacuity, size and distance perception, hand-eye coordination, field of view and optical characteristics, all showed differences in performance among the various facemasks (NSMRL in press). The surface supported prototype hard-hat system being considered by the Navy was also subjected to the same tests for evaluation (NSMRL in press). A final study revealed the causes of poor stereoacuity underwater to be increased accommodation and insufficient peripheral stimulation (NSMRL #711). Several investigations of underwater distortions were completed (NSMRL #694, 724) and final Recommendations for training techniques to improve the accuracy of divers' distance estimates were made (NSMRL #710, 713).*</p> <p>Publications: Six reports (NSMRL Nos. 694, 710, 711, 718, 724, 731).*</p>							

*Available to contractors upon originator's approval.

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY					1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	3. REPORT NUMBER	
						73 07 01	DD FORM 1 (R) 636 (3900)	
4. DATE PREV SUMMARY	4. KIND OF SUMMARY	5. SUMMARY CATEGORY	5. WORK SECURITY*	7. REGRADING*	8a. DISSEM INSTRN	8b. SPECIFIC DATA CONTRACTOR ACCESS		9. LEVEL OF SUM
72 07 01	D. Change	U	U	N/A	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		A. WORK UNIT
10. CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER		WORK UNIT NUMBER
a. SUMMARY		63713N		M4306		.03		2090DXC9
b. CONTRIBUTING								
c. CONTRIBUTING								
11. TITLE (Precede with Security Classification Code)*								
(U) Acoustic orientation and navigation by navy divers								
12. SCIENTIFIC AND TECHNOLOGICAL AREAS*								
006000 Escape, rescue and survival; 013400 Psychology								
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD		
69 03		76 06		DN		C. In-House		
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS		b. FUNDS (In thousands)
a. DATES/EFFECTIVE: N/A				PRECEDING		.05		51.2
b. NUMBER:*				FISCAL YEAR		CURRENT		
c. TYPE:				74		.05		47.4
d. AMOUNT:								
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION				
NAME: Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS: Box 600, Submarine Base NLON Groton, Connecticut 06340 RESPONSIBLE INDIVIDUAL NAME: BAKER, J.H., CAPT MC USN TELEPHONE: (A.) 241-3263				NAME: Auditory Research Branch ADDRESS: Naval Submarine Medical Rsch. Lab. Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution) NAME: SMITH, P.F., GS-13 TELEPHONE: (A.) 241-3201 SOCIAL SECURITY ACCOUNT NUMBER: ASSOCIATE INVESTIGATORS NAME: HARRIS, J. Donald, GS-15				
21. GENERAL USE								
22. KEYWORDS (Precede EACH with Security Classification Code)								
(U) Diver orientation; (U) Underwater hearing; (U) Diver navigation								
23. TECHNICAL OBJECTIVE, 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)								
23. (U) TECHNICAL OBJECTIVE. To determine the degree to which free-swimming divers can utilize auditory sensory capacities to orient themselves in three-dimensional underwater space, to navigate, locate and/or avoid obstacles, and localize sources under water. Also to provide baseline data for the evaluation of sensory enhancement systems, such as hand-held sensors and related devices.								
24. (U) APPROACH. Performance on three-dimensional orientation, navigation, and sound source localization problems by Navy divers will be compared to performance on similar tasks in air. Experiments will be designed to isolate cues relevant to accurate localization of sounds arrayed in vertical planes since such orientations are of greater importance to free-swimming divers.								
25. (U) PROGRESS. (Dec 71 to Dec 72) Arrangements were made to conduct research in underwater acoustic orientation by divers at the Narragansett Bay Campus of U.R.I. Two experiments were conducted to determine the ability of divers to discriminate the angular separation of underwater sound sources. It was determined that in a reverberant environment divers can localize sound sources with fairly high degree of accuracy. Further experiments are being planned to determine whether underwater sound localization skills can be utilized in practical navigation situations.								
Publications: Underwater hearing in man: III. An investigation of underwater sound localization in shallow water. Smith, Yonovitz, and Dering. NSMRL report in preparation.								
Underwater hearing. Harris, J.D. NSMRL report in preparation.								

*Available to contractors upon originator's approval.

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RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL DD FORM 1498 (AR) 636 3900	
3. DATE PREV. SUMMRY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA CONTRACTOR ACCESS	9. LEVEL OF SUM
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10. NO/CODES*		PROGRAM ELEMENT		PROJECT NUMBER		TASK AREA NUMBER	
a. PRIMARY				M4306		03	
b. CONTRIBUTING						2111DXK9	
c. CONTRIBUTING							
11. TITLE (Precede with Security Classification Code)* (U) Analysis of Human Performance Relating to Emergencies in Hyperbaric Environments							
12. SCIENTIFIC AND TECHNOLOGICAL AREAS* 007500 Human Factors; 016300 Safety Engineering; 00600 Escape, Rescue & Survival							
13. START DATE		14. ESTIMATED COMPLETION DATE		15. FUNDING AGENCY		16. PERFORMANCE METHOD	
72 07		77 07		DN		C. In-House	
17. CONTRACT/GRANT				18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	
a. DATES/EFFECTIVE:				PRECEDING			
b. NUMBER*				FISCAL YEAR		b. FUNDS (In thousands)	
N/A				1973		1.0 42.8	
c. TYPE:				CURRENT			
d. KIND OF AWARD:				1974		1.0 37.8	
19. RESPONSIBLE DOD ORGANIZATION				20. PERFORMING ORGANIZATION			
NAME:* Naval Submarine Medical Research Lab. Naval Submarine Medical Center ADDRESS:* Box 600, Naval Submarine Base NLON Groton, Connecticut 06340				NAME:* Human Factors Branch Naval Submarine Medical Res. Lab. ADDRESS:* Box 600 Naval Submarine Base NLON Groton, Connecticut 06340 PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)			
RESPONSIBLE INDIVIDUAL NAME: BAKER, J.H., CAPT. MC, USN TELEPHONE: (203)449-3263; Autovon: 241-3263				NAME:* Ryack, B., GS-13 TELEPHONE: (203)449-3668; Autovon: 241-3668 SOCIAL SECURITY ACCOUNT NUMBER:			
21. GOVTAL USE				ASSOCIATE INVESTIGATORS NAME: Walters, G., GS-9 NAME:			
22. KEYWORDS (Precede EACH with Security Classification Code) (U) Underwater Manned Operations; (U) Habitability; (U) Safety; (U) Performance Under Stress							
23. TECHNICAL OBJECTIVE* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.) 23. (U) TECHNICAL OBJECTIVE: To provide behavioral data relative to the effectiveness of human performance, and to survival, during emergency situations in submarine, diving, and other hyperbaric systems. To develop human factors principles which are specifically applicable to the effects of potential emergencies on systems design. 24. (U) APPROACH: Reliability, efficiency, and safety of performance is measured on tasks representative of those required in submarine, diving, and other hyperbaric systems. Laboratory studies are supplemented by the use of hyperbaric facilities and underwater simulations. Performance and psychophysiological measures are obtained to determine whether hyperbaric environments lead to alterations in the parameters of the task-performance relations observed in normal environments. Appropriate recommendations for task modification or design are made. 25. (U) PROGRESS. A series of pilot studies and two major studies were completed evaluating the effect of reaction time on the speed with which connections to emergency supply lines can be broken to facilitate escape. The effects of both dry and hyperbaric environments were evaluated. Four reports based on work completed under Work Unit MF12.524.006-9025BA9K.40 are in the final stages of completion. A paper entitled <u>Human Factors in Submarine Escape</u> was presented at the SMRL International Workshop on Escape and Survival from Submersibles.* Publications: Ryack, B.L. & Walters, G. NAVSUBMEDRSCHLAB Report No. 696 CONF. Ryack, B.L., et.al. Submarine escape: side, tube, and top egress with alternative escape appliances and team sizes. <u>Human Factors</u> , 1972.							

*Available to contractors upon originator's approval.

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Security Classification

DOCUMENT CONTROL DATA - R & D

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13. ABSTRACT <p>This report consists of a compilation of the Research and Technology Resume, DD Form 1498, reporting progress on 35 Bureau of Medicine and Surgery Research Work Units assigned to the Naval Submarine Medical Research Laboratory at the Naval Submarine Medical Center for the calendar year 1972.</p> <p>For each work unit there is a description of its <u>Objective</u>, the <u>Approach</u> and the <u>Progress</u> during the year and a listing of any publications completed during the year.</p>			

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